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TRAFFIC ACCIDENT STUDY

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HALTON REGIONAL POLICE FORCE

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JANUARY 26, 1981

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TRAFFIC ACCIDENT STUDY
FOR REGIONS OF
HAMILTON-WENTWORTH, HALTON AND NIAGARA
FOR FOUR MONTHS OF MAY THROUGH AUGUST 1980

INTRODUCTION:

This Study was undertaken at the request of the Hon. Roy McMurtry, Q.C., Attorney General and Solicitor General for the Province of Ontario.

It was the outcome of a private breakfast meeting convened by Mr. McMurtry in Hamilton on October 1st, 1979, attended primarily by elected and appointed officials of the three Regions of Hamilton-Wentworth, Halton and Niagara. Its purpose was to evoke discussions and suggestions which could contribute to a reduction in traffic accidents in Ontario.

Later, the Solicitor General requested the Hamilton Automobile Club to undertake "a pilot project for the review of traffic accident statistics in the three Regions of Hamilton-Wentworth, Halton and Niagara". Mr. McMurtry added that there was "considerable merit in developing a scale model on the causes of traffic accidents, with particular emphasis on those involving fatalities and personal injuries in the three Regions...It is my understanding that the Hamilton Automobile Club already has been working closely with Police Forces in your area on traffic safety matters".

The Hamilton Automobile Club and the three Regional Police Forces accepted this assignment.

The Hamilton Automobile Club then appointed Mr. Robert Webster, Study Coordinator, and the Ontario Police Commission assigned Mr. Cal Beacock, Traffic Safety Coordinator, to work with the Study group.

Preliminary drafts of study forms and methods were carried out by H.A.C. and the office of the Ontario Police Commission with assistance from a representative of the Ministry of Transportation and Communications. Several meetings were held with Chief Gordon Torrance of Hamilton-Wentworth, Chief James Harding of Halton and Chief Donald Harris of Niagara Regional Police Forces, from which the methodology of the Study was finally determined. Following this

determination a working Committee of the three Regions was appointed.

Basically the following decisions were agreed upon:

(a) Rather than a historical review, the Study would be a forward study for the period May 1 to August 31, 1980.

(b) It was agreed that a Supplementary Reporting Form, for completion by the accident investigating officer, be used in conjunction with the Standard Motor Vehicle Accident (MVA) Report Form.

(c) The Study would be confined to accidents involving fatalities and hospital admission injuries.

It should be noted that this Study was confined to roads and highways under the jurisdiction of the three Regional Police Forces and did not include areas covered by the Ontario Provincial Police. For this reason there is an under-representation of commercial traffic accidents involving heavy trucks and an omission of accidents occurring on controlled access highways. Further, the Study was conducted during 'good weather months', although such months are considered heavy traffic months.

(d) In order to develop relevant data not ordinarily revealed in the Standard MVA Report, and to encourage investigating police officers to contribute impressions and judgments as to cause(s) of accidents, it was agreed to treat the individual supplementary reports as confidential information 'to be used for Study purposes only'. The decision to seek the personal impressions of the investigating officer as to cause(s) of accidents reflects the philosophy expressed by Toffler:

> "We tend to reduce causality to a simple minded search for a single cause. We tend to look at things one way instead of through multiple lenses."

In effect, we were asking the police officers to look at accidents "through multiple lenses". This required initiative and personal judgment but it was hoped that those observations, plus the more structured form of the Study, could assist in seeking effective relief to the current traffic accident dilemma. A particular example of this exercise was to gain a better insight into 'lost control' accidents; we believe pertinent information was produced dealing with this type of accident.

(e) The MVA Report Form together with Supplementary Reports were to be submitted to the H.A.C. Study Coordinator, as completed, for tabulation and correlation, supported by additional data from police records and documentation, including statements of witnesses. Driving records were received from the Ministry of Transportation and Communications through the cooperation of the Ontario Police Commission.

(f) Ninety on-site inspections were carried out by A. Lomax, former Traffic Director of the City of Hamilton and R. Webster, Study Coordinator.

(g) A request was made to Dr. Fraser Mustard, then Dean of McMaster Medical Centre, for assistance by various Departments of the Medical Centre. As a result, Professor Robin Roberts of the Dept. of Epidemiology and Biostatistics assisted in the final drafting of the supplementary form.

When Study results were tabulated, arrangements were made through Dr. Homer Beattie, Chairman of the Department of Surgery, to have the Study results reviewed by Dr. Frank Baillie, Director of Emergency Services, Chedoke-McMaster Hospitals. The purpose was to determine if there were obvious medical aspects of the Study which could be developed to provide important additional data. Dr. Baillie and his colleagues, Dr. Thomas, Regional Trauma Program Director and Dr. Ferris, Head of the Department of Forensic Pathology, Hamilton General Hospital, have expressed keen interest and believe the Study provides important source information which would warrant further study.

The Study results cover 330 accidents involving 890 persons, resulting in 46 fatalities, 255 major and 194 minor injuries; in most instances, they are self-explanatory. However, we have added some highlights and observations, supported by references and resources derived from other sources.

It is the hope of the Study Committee members and all who

fully and wholeheartedly gave their cooperation, that this report meets the mandate given to us by the Hon. Roy McMurtry, Solicitor General of the Province of Ontario.

Respectfully submitted by

Chief Gordon Torrance
Chief James Harding
Chief Donald Harris

January 26th, 1981.

Alfred U. Oakie, Chairman

STEERING COMMITTEE:

Mr. A. U. Oakie, Chairman, Executive Vice-President and General Manager, Hamilton Automobile Club.
Chief Gordon Torrance, Hamilton-Wentworth Regional Police Dept.
Chief James Harding, Halton Regional Police Dept.
Chief Donald Harris, Niagara Regional Police Dept.

WORKING COMMITTEE:

Mr. A. U. Oakie, Chairman, Executive Vice-President and General Manager, Hamilton Automobile Club.
Mr. Robert Webster, Study Coordinator, Hamilton Automobile Club.
Mr. Cal Beacock, Traffic Safety Coordinator, Ontario Police Commission.
Staff Sergeant Gordon Ferris, Hamilton-Wentworth Regional Police Dept.
Staff Inspector Ray Andress, Halton Regional Police Dept.
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Dr. F. G. H. Baillie, Director of Emergency Services, Chedoke-McMaster Hospitals.
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Mr. Shaun MacGrath, Chairman, Ontario Police Commission.
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Deputy Chief J. Patterson, Hamilton-Wentworth Regional Police Dept.
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Mr. R. Smith, Director of Public Relations and Safety, Hamilton Automobile Club.
Inspector A. Stansbury, Halton Regional Police Dept.

REVIEW AND OBSERVATIONS OF TRAFFIC ACCIDENT STUDY FOR HAMILTON-WENTWORTH, HALTON AND NIAGARA FOR FOUR MONTHS OF MAY THROUGH AUGUST, 1980

SECTION 1

GENERAL ACCIDENT INFORMATION:

This section is self-explanatory and is simply a summation of the accident characteristics throughout the Study.

Nevertheless, it should be noted that in Section 1.3 a high percentage of accidents is occurring on Fridays, Saturdays and Sundays, with a good portion of the Sunday accidents actually being a carry-over of Saturday night driving trips. No doubt this reflects a higher incident of travel. This would require further examination but it may confirm a study carried out in Germany which showed that the number of accidents occurring on Fridays during the peak travel summer months of July, August and September were almost 40% higher than other Fridays of the year. The study also shows that the number of accidents occurring on Fridays during the peak travel summer months of July, August and September were almost 40% higher than other Fridays of the year. The Study also shows that the number of accidents on holidays during this quarter, is 15.7% higher than the total of the other nine months. If these factors can be confirmed, it obviously indicates the need for heavier revealed enforcement during the holiday weekends.

Section 1.4 ('Occurrence by Hour of Day') shows a departure from past patterns in that the single most frequent hour for a serious accident, was 5:00 to 6:00 p.m. However, there continues to be a significant number of accidents from 9:00 p.m. to 3:00 a.m., the hours of darkness and so-called 'drinking hours'.

Section 1.5 ('Kind of Accidents') relates to both single and multiple-vehicle accidents. It is noted that fatal collisions are moderately over-represented in single-vehicle accidents, compared to two-vehicle accidents.

At this point we would express the caution that we should not attempt to make too literal an interpretation of this kind of statistic and assume that all single-vehicle accidents were the result of erratic or improper behavior. For example, we do not know whether some of these accidents, including multiple-vehicle accidents, were the result of the medical condition of the driver. This is a grey area requiring more detailed study. Recently a German Cardiologist reported on "The Chronically Ill in Traffic". The report dealt primarily with people experiencing heart conditions and it was noted that myocardial infarction (heart attacks) usually occur very suddenly and unexpectedly. To date it has not been possible to determine how significant heart attacks are as a cause of traffic accidents. Nevertheless, there are drivers who have known heart conditions and it is generally acknowledged that heart patients, due primarily to their tendency to tire quickly, should be extremely cautious of mingling in traffic.

Although current legislation requires members of the medical profession to report to the provincial government, patients with known medical problems which could in some way impair their driving ability, doctors may be reluctant to report such patients, for a variety of reasons. A report by Mr. Justice Horace Krever, said that many inconsistencies were found in what information doctors would or would not keep confidential. Justice Krever said, "Doctors are caught between the right of the patient and those of society in general."

Although visual ability criteria are precise, and can be accurately checked, it is obvious that a physician caring for patients, has a greater insight into the ability or lack of ability of a person to handle driving tasks. Therefore, this area should be given further

examination in order to convince those in the medical profession that they are serving the best interests of their patients, without being guilty of breach of confidentiality when they report patients to the Driver Examination Board. Every precaution must be taken to protect the confidentiality of the doctor.

Section 1.6 ('Non-collision Event') reflects accidents in which another vehicle or fixed object was not involved. There were six fatalities and 34 roll-over accidents. In the 11 hit-and-run accidents, the suspect driver was apprehended on only four occasions. The hit-and-runs included four pedestrian and three bicycle accidents.

In Section 1.7 ('Initial Impact Type') the single-vehicle accident is listed again as the most critical, particularly in terms of fatal accidents. Angle collisions and turning movements combined, represented another substantial body of accident characteristics, involving nine fatal collisions. Later in other sections, we will deal with turning movements as particular causes of accidents.

SECTION 2

DRIVER RELATED ACCIDENT FACTORS:

A significant feature of this section is the one dealing with 'Extent of Injury by Safety Equipment Use' (Section 2.2). As noted in the footnote to this Section, when comparing known seat belt users to non-users, 456 out of 603 (75.6%) of drivers and passengers were wearing seat belts. Although there could be some disparity here (e.g. passengers fastening seat belt when police approach, or passengers having unfastened their belts immediately after the accident in an attempt to leave the vehicle before the police arrived) there seems to have been a higher compliance of the seat belt law than reported in other studies and tests.

Section 2.3 ('Extent of Injury of Ejected Person') makes it clear that those persons ejected from their vehicles suffered much more serious injury on the average than persons not ejected. A strong point for the Seat Belt Law. In fact, every person ejected suffered a personal injury.

Section 2.4 ('Age and Sex of Drivers') holds very few surprises. The age and sex of drivers involved in traffic accidents in the three Regions during the Study were compared to the distribution of drivers in the province of Ontario by age groups and sex. Again, males 16 to 19 years of age were vastly over-represented in all 'drivers involved' and 'at-fault' drivers. Those 20 to 24 are also significantly over-represented but to a lesser degree. Males 25 to 34 are about evenly represented. Drivers over 35 are involved in fewer accidents and this becomes even more apparent for 55 year olds and over.

Section 2.5, ('Drivers and Accidents Involving Improperly Licenced Drivers') is a very critical section and this activity deserves closer examination and action. Members of the Working Committee who are involved in day-to-day examination of traffic advise that there is a growing body of people who are driving with suspended or cancelled licences. Consequently, it is suggested that those who blatantly defy the law by continuing to drive when their licence is under suspension or after their licence has been cancelled, should receive much heavier penalties than the $28.00 fine now provided.

Heavier penalties are suggested because about 12% of drivers in the Study were not properly licenced at the time of their accident, and over 90% of those drivers were at-fault. There is no doubt that this constitutes a problem. There are other variations of 'non-licenced status' including younger people who have not yet secured a licence, but the most flagrant would appear to be those who are driving while under suspension or when their licence has been cancelled.

It is significant that 24 of 55 (43.6%) non-licenced drivers were operating motorcycles (see Section 2.5(d).) We do have a separate section on motorcycles, but it should be noted at this point that motorcycles represented 12.1% of the vehicles. This represents a heavy over-representation of motorcyclists among the non-licenced drivers, no doubt attributable to many driving with an improper class of licence e.g. holding an auto licence but not a motorcycle licence.

Section 2.5(e) deals with 'Alcohol Contribution to Causes of Accidents'. There was no indication of alcohol in 60.4% of the accidents examined and evidence of alcohol in 39.6%. Again, considering the Study average of 16.9% (see Section 2.10(a)), it does appear again that unlicenced drivers are over-represented in alcohol-related accidents.

Again, under Section 2.5(f) ('Selected Driver Actions of Improperly Licenced Drivers'), only 9.1% of unlicenced drivers were driving properly versus 40.9% of all drivers involved in the Study. Because of the significance of the problem of unlicenced drivers and the report of members of the Working Committee that occasionally there will be 'borrowing of a licence', members of the Working Committee expressed the view that photographs on the driver's licences would eliminate many of these problems. It would not, of course, eliminate the behavior of some people driving with a borrowed licence, while under suspension or having licence cancelled.

We must point out that under Section 2.5(g) only 31% (17 of 55) of non-licenced drivers were charged under 13(1) or 14(1) of the HTA (the sections dealing with no or improper class of licence or failing to produce licence). 18.2% of (10 of 55) non-licenced drivers were charged under the Criminal Code. This compares to an average of 6.5% (26 of 400) for properly licenced drivers charged under the Criminal Code.

Section 2.6 ('Vehicle Manoeuvre') although straightforward, does reflect some concerns. Aside from 'going ahead' movement, left turns constituted the next highest involvement in accidents. It is obvious that minimization of this problem does require specific examination of individual intersections by Traffic and Engineering Departments, including proper phasing of traffic signals to provide for advanced signals or late turns, where turning movements are heavy. A recent report in the 1980 Institute of Traffic Engineering Journal concerned a study conducted by Professor P.A. Habib, Associate Professor of Transportation Engineering at the Polytechnic Institute of New York. It dealt with the hazards of turning vehicles as they relate to pedestrian safety. His research brought out the point that visibility from within the vehicle is one of the factors responsible for most of the difference between left-turn and right-turn accidents. He pointed out that there is visibility block-out for a typical driver and vehicle from the left roof support. He also suggests that driver error increases when the left turn manoeuvre is being made, compared to right hand turns. Further, there should be greater educational exposure to the hazards of left turns.

Section 2.7 ('Driver Action and Driver Condition') reflects the investigating officer's judgment in some cases. However, lacking adequate measuring tools, it is believed that fatigue and medical defect are perhaps under-rated as a driver condition. Similarly, impairment due to drugs is also believed to be under-rated. Nevertheless, a relatively high percentage of persons in loss-of-control accidents had been drinking. However, this does not necessarily mean that the alcohol consumed contributed directly to the cause of the accident. Elsewhere we deal with the alcohol problem as a relative cause of accident.

Relative to the question of drug impairment, the Traffic Injury Research Foundation produced a report in 1980 dealing with cannabis and driving. It is rather interesting that the report states: "The

highest risk factor was among users of tranquilizers and anti-depressants, followed by users of alcohol, cannabinoids and anti-histamines respectively."

Based on consideration of the data provided in that Study, the authors argued that alcohol remains the drug of greatest concern to traffic safety as it ranks among the highest in terms of frequency. However, the report goes on to say that "next to alcohol, it is apparent that use of cannabinoids and the use of tranquilizers/anti-depressants are of greatest concern to traffic safety". For this reason, it is strongly suggested that legislation should require that all 'pharmacy drugs' which can impair driving ability in any way, be clearly labelled with a warning, such as on tobacco products. In this instance, however, it is more critically important than tobacco warnings because the user of such drugs can have a detrimental effect not only on themselves, but on other users of the highways.

'Lost Control' (Section 2.8) reflects the judgment of the investigating police officer. There were 116 such accidents though in some accidents more than one reason was given, in line with the direction given to the police officers to look for more than one cause. Of the 116 accidents, 53 were due to 'speed too fast for conditions'. This was broken down further to indicate that of the 53, 19 involved a curve in the road; 16 with alcohol in the driver's blood; 8 travelling on gravel roads; 5 due to inattention of driver; 4 due to wet road conditions; 4 to turning movements and 3 to passing movements. Loss of control due to 'railroad tracks' involved motorcycles. It also appears there are still drivers unable to demonstrate proper vehicle handling when the vehicle wheels drop off the roadway on to the shoulder. This should be given more attention in Driver Training Programs and in public service information messages.

Section 2.9 ('Visibility') excludes perhaps the worst visibility

problem -- darkness. However, the mix of vehicles on the roadway is emerging as a cause of accidents due to blockage of sight. The increasing popularity of the van is significant and in a study of van accidents carried out in Michigan and Ohio, obstruction of views by vans were caused: (1) when they make left turns and block the view of oncoming traffic; (2) when they stand between a car and overhead signals; (3) when they are parked along a street and (4) when they are travelling in front of a car attempting to pass on a two-lane highway. A vehicle not well illuminated or reflectorized also caused significant visibility problems and this was related primarily to bicycles.

Section 2.10 relates to 'Characteristics of Accidents In Which Alcohol was Judged Contributory to the Cause by the Investigating Police Officer'. Reference must be expressed to relate this to Section 2.10(f) dealing with charges for impaired driver having over 80 mgs of alcohol/breath or refusing the breathalizer test. Nevertheless, alcohol or drugs were judged by the investigating officer to directly or indirectly contribute to the causes of 98 out of 313 (31.3%) of Study accidents. Of this, police investigating officers judged that 87 of the 514 Study drivers (16.9%) consumed enough alcohol as to contribute in some way to the cause of the accident.

Section 2.10(b) deals with alcohol involvement of drivers, pedestrians and passengers in fatal accidents only.

Police investigating officers feel there were seven injured individuals who were taken to the hospital and then subsequently died before police officers had an opportunity to make a test or make judgment; 13 of the remaining 32 fatal accidents or (40.6%) did have alcohol involvement. (At this point, we should mention an observation, by a member of the Working Committee, that seriously injured traffic victims are rushed to the hospital and there is no further contact in terms of attempting to determine their condition prior to the accident, with particular reference to alcohol impair-

ment. The question is raised as to whether the medical profession would be willing to provide a sample of blood when blood is taken for medical purposes.)

Age by class of individuals relating to alcohol involvement in all fatal injury accidents indicates again that motorcyclists have an involvement disproportionate to their percentage of the total driving group involved in the Study. However, it should be noted that the 16 to 34 age group represents 84.2% of the 95 alcohol involvements. This emphasizes that alcohol presents a critical problem for that group. It should also be noted that alcohol in motorcyclists was exclusively confined to the 16 to 34 age group.

There is also a noticeable departure from past study patterns of alcohol involvement by pedestrians. Our Study indicated that there was alcohol in 16 - 19 year old pedestrains, contributing to the cause of 4 of the 7 alcohol related pedestrian accidents. In the past, alcohol involvement was a factor primarily in older pedestrians.

Significant is 2.10(d) dealing with the 16 to 24 age group; it indicates that 1 in 6 (16 of 95) of the serious accidents included in the Study in which alcohol contributed to the cause, involved an under age drinker. This does emphasize again the rationality and desirability from a traffic accident prevention standpoint of increasing the permissible drinking age to a more mature adult level.

Section 2.10(e) dealing with driver action, clearly indicates that 'lost control' was a significant factor in alcohol users. Although the drinking and driving practice cannot be condoned in any way, it is acknowledged that one of the most difficult and frustrating road safety problems to deal with is the driver having a degree of alcohol impairment.

It is also acknowledged that the primary key should be prevention

of such accidents and to lighten the effect of driver failure, for whatever cause. For this reason we would report on the concept of an engineering approach to alcohol countermeasures, by researchers at Potter's Industry on the effect of increasing the width of edge line on the lateral position. It improved the behavior of drivers who were dosed to levels of 0.05 and 0.08 BAC on a controlled test course of two-lane rural roads. This study was undertaken in West Milford, New Jersey, with the cooperation of the West Milford Township Police.

Medical research in the past decade has revealed that visual contrast sensitivity is reduced by alcohol ingestion. The peripheral vision of the eye is rendered less effective. The field of vision concentration is narrowed until the driver simulates viewing from inside a tunnel. The conclusion of the authors of the West Milford work was that the addition of wider edge lines to highways did indeed have some effect on alcohol impaired drivers and reduced their potential for accidents.

For test purposes, in the West Milford, N.J. study, six miles of rural roads were marked with 4", 6" and 8" edge lines and control groups of drivers included one group with placebo drinks and the other dosed to 0.05 BAC or 0.08 BAC. The 8" width edge lines gave consistent incremental improvements over the benefits of the standard edge lines. With these widened edge lines, the test drivers exhibited less weaving and greater centrality of position in the driving lane. Significant, was the fact that dosed subjects performed about as well on 8" edge line conditions as placebo subjects did on 4" edge lines.

Although the authors indicated it is too early to generalize the results of the work, there is a prospective conclusion that if further significant progress is to be made in highway safety in respect to the problem of alcohol, this is probably the best chance of such, on a cost-effective basis.

This is supported further, by generalized practical research evidence showing that the most cost-effective means of reducing accidents is by modifying or correcting those road environment factors which are responsible for errors in driver behavior. The British Transport and Research Laboratory recently reported that "although human factors play the largest part in contributing to accidents, they are difficult to identify and costly to remedy. Remedial measures of an engineering nature can have a big impact on accidents because road environment factors are relatively easy to identify and can often be alleviated fairly quickly and with low-cost remedies.

Additionally, we would again refer to proposals made to the Provincial Government in the past to establish DWI counter-attack programs. These are Clinics established under government sponsorship to which those charged with driving-while-impaired or having an excess amount of alcohol in the bloodstream, would be directed by the Courts. Such Clinics have been in position in the United States for a number of years, and have also worked reasonably well in Alberta. Clinics do not attempt to moralize, rather adopt as a theme 'If you drink that's your business -- if you drink and drive, it's everybody's business'.

It is obvious that the drinking problem has not been corrected despite heavier enforcement, and tougher legislation, including amendments to the Criminal Code several years ago. Consequently efforts should be made to find solutions that will work. This is not to say, that there should be any letdown in enforcement, but rather, it should be supplemented so that we can gain ground on this difficult problem.

The value of DWI Clinics is reflected in 2.10(g) which shows that 12 of the 71 (16.9%) of drivers in alcohol-related accidents had a prior conviction within the last 5 years for impaired driving; over 80 mgs; or refusing the breathalizer test. In comparison with the remaining 345 drivers for which records are known, only 10 (2.9%)

had any alcohol-related prior convictions. It should also be noted under 2.10(f), that of the 95 accidents in which alcohol was reported to be contributory to the cause of the accident, only 17 drivers were charged with impaired driving or over 80 mgs or refusing breathalizer tests. 13 more were charged under other sections of the Criminal Code while 29 drivers were charged with careless driving.

Section 2.11, listing the most frequent charges, indicates the seriousness of the drinking problem.

Section 2.12 is an interesting section and is an attempt to analyze driver records and past patterns of drivers involved in accidents. The description of this section is self-explanatory but the three main elements of a driver record include: (1) Criminal Code of Canada convictions; (2) Suspensions; (3) Demerit Point Totals. In Section 2.12(f) an attempt is made to show alcohol as contributing to the cause of the accident, by a record class of drivers. In this section, the trend is clear. Drivers in Class III to VII are over-represented in alcohol related accidents. Of particular note is the heavy over-representation of drivers with prior Criminal Code convictions in Class IV especially.

Referring to the classification system of driver records, we would point out that Class III contains 7 or more demerit points but no Criminal Code convictions or suspension; Class IV has zero to 6 current demerit points but the sum of Criminal Code convictions plus suspensions is 1 or 2; Class V, 7 or more current demerit points and Criminal Code convictions plus suspensions is 1 or 2; Class VI, zero to 6 current demerit points and Criminal Code convictions plus suspensions are 3 or more; Class VII, 7 or more current demerit points and Criminal Code convictions are 3 or more suspensions. We emphasize 'current demerit points' because demerit points are regained after two years. Again we would caution that the classification system designed for the Study is not perfect but in the opinion

of the Study Committee, it sufficiently distinguishes between the 'good' and the 'bad' records in a fair and just manner.

Section 2.12(l) is also an interesting one in that there are a variety of convictions not included in the classification of driver records; noticeable is the heavy over-representation of Class III and V drivers -- drivers having high current demerit point totals, tending to commit offenses not within the demerit point system more frequently than drivers with low demerit point totals.

We believe that other schedules under this classification system provide some interesting data as well. In Section 2.12(h) it is noted that 85% of the drivers 16 to 19 year olds have limited point loss with only five of them having a Criminal Code conviction. No doubt this superior record, despite their heavier involvement in traffic accidents, is related to their limited driving experience. However, drivers in the 20 to 24 age group have unquestionably the worst record. This group is vastly over-represented in Classes III to VI.

Section 2.12(k) dealing with the 'record of drivers who disobeyed traffic signal lights or stop signs' shows that 7 of 33 (21.2%) known records indicated a prior conviction for disobeying a traffic signal or stop sign. In comparison, of other Study drivers who did not disobey a traffic signal or stop sign, only 29 of 383 (7.5%) of known records indicated a prior conviction for disobeying a traffic signal or stop sign.

We are encouraged with the fact that 31.8% of the drivers who had disobeyed a signal light or stop sign had no prior convictions at all. The number of bicyclists disobeying a traffic signal or stop sign was 11.4%, well above overall bicycle involvements, indicating the need for improved traffic training education for bicycle drivers. This again raises a problem of traffic light and stop sign compliance. In recent months, concern has been expressed that some

municipalities have engaged in excessive use of stop sign installations. Four-way stop signs and over-size stop signs create the danger of disrespect for such important traffic controls. Furthermore, with the need to conserve energy, municipalities are being encouraged to carefully examine stop signs and variations of stop signs particularly four-way stop signs. More critical, are traffic signal violations with a clear indication that signal phase changes pose a significant problem. In reviewing the 20 accidents in which drivers disobeyed traffic signals, it appears from the context of the reports that six of these occurred at phase changes.

SECTION 3

CHARACTERISTICS OF MOTORCYCLISTS AND MOTORCYCLE ACCIDENTS:

There were 61 motorcycle accidents in the Study involving 62 drivers and 18 motorcycle passengers. Motorcycles were involved in 18.5% of the total of 330 Study accidents and motorcyclists represented 12.1% of the 514 Study drivers. Consequently, motorcycles were highly over-represented in fatal accidents, compared to their percentage of the total Ontario vehicle population. The weekend including Friday, appeared to be the most critical, consistent with overall accident characteristics. However, 47.5% of the motorcycle accidents occurred in hours of darkness versus 40% for the overall Study.

Again, the 20 to 24 age group seems to be the most critically over-representative group as a percentage of all Study drivers. According to investigating officers' opinion, alcohol contributed to 25.8% of motorcycle accidents. This is compared to 17.1% for drivers of all other motor vehicles. Motorcycle defects contributed to the cause of more accidents (4) than defects in any other vehicle type. Although motorcycles were slightly under-represented in

intersection accidents, they were over-involved at level curves and curves on hills. Critical, is the Section 2.5(d) showing that 24 of all 55 (43.6%) improperly licenced drivers were driving motorcycles. Most encouraging was the fact that as reported in 2.2, dealing with the extent of injury and safety equipment use, 75 out of 80 (94%) motorcyclists were wearing helmets. This factor must be kept in mind because of the recent tendency in some jurisdictions in United States to repeal compulsory helmet laws. Obviously, serious injuries and fatalities would have increased dramatically if helmets had not been worn.

SECTION 4

CHARACTERISTICS OF BICYCLISTS AND BICYCLE ACCIDENTS:

Although there were 34 bicyclists involved in 330 (9.1%) of the Study accidents, bicycle fatalities represented 7 (15%) of the 46 total fatalities. Again we see a changing pattern in accidents involving bicycles, an increasing older age group involved in fatalities and injuries. The most critical ages appeared to be from 10 to 19. 7 out of 30 (23.3%) of the bicycle accidents occurred during hours of darkness. Unfortunately there were three fatalities in one accident at night. In five of seven night-time bicycle accidents, inadequate bicycle illumination or reflectorization was judged to be partly contributory to the cause of the accident. This raises the question of vehicle equipment. Several years ago, there was a proposition that since bicycles required reflectors and lights for night driving, bicycles should not be sold unless properly equipped with reflectorization equipment or material and appropriate lights. The analogy drawn was that headlights and tail lights are compulsory for automobiles, with the assumption being that they could be driven at any hour of the day or night and not reserved for daytime use only. If bicycles continue in their popularity, this proposition should be re-examined. Furthermore, with five and ten-speed bicycles capable

of travelling at high rates of speed, there must be good comprehension of traffic and traffic laws. The question is raised as to whether drivers of such vehicles (multi-speed bicycles) should be required to have a driver's licence similar to the separate licence issued to motorcyclists.

In a report produced in the past year by the Traffic Injury Research Foundation, it was indicated that there could be a substantial number of unreported bicycle accidents and bicycle injuries occurring. This would be the case of children injured on bicycles being taken directly to the Emergency Department of hospitals, without a report being placed with the Police Department. Consequently, bicycle injuries are under-represented in terms of official reporting processes. Perhaps if police or health review authorities were given access to the files of hospitals' emergency departments, then the extent of the problem could be determined.

SECTION 5

CHARACTERISTICS OF PEDESTRIANS AND PEDESTRIAN ACCIDENTS:

There were 52 pedestrian accidents (15.8% of all Study accident records) involving 57 pedestrians. We see a slight shift from past patterns when the most critical ages for pedestrian injuries and fatalities were the very young or the very old. Our Study indicates the most significant age group involved in pedestrian accidents were the 15 to 19 year olds, with the 20 to 24 age group being equal to the 0 to 4 and the 5 to 9 age groups. This suggests the readoption of the strong pedestrian promotional programs so effective several years ago.

Referring to Section 5.8 ('At-fault Pedestrian Action and Age of Pedestrian') there is evidence that improper action on the part of the 15 to 19 age group primarily contributed to pedestrian accidents.

For example, 'riding on the exterior of vehicle' were all in this age category with one exception, while 'trying to push vehicle out of ditch' involved 17 and 18 year olds. Senior citizens were over-represented in crossing the street and being inattentive. Youngsters are victims of 'running into roadway' or 'running into roadway from between or in front of parked vehicles'.

According to investigating police officers, alcohol contributed to the cause of seven pedestrian accidents. In Section 5.12 we have evidence that drivers of left turning vehicles may not be capable of seeing pedestrians in the intersection.

SECTION 6

TYPES OF VEHICLES INVOLVED AND RELATIONSHIP:

This section reveals a growing traffic problem which could become more critical in the next 2 or 3 years. This was an attempt to determine whether the mix of vehicles on the roadway contributes to severity or causes of accidents. Noticeable, is the over-representation of motorcycles in fatal and hospital admission accidents. They are over-represented by more than six times their position in the Ontario vehicle-mix population. Tractor trailers and other trucks are distorted in this Study since highways were not included, nor areas under the patrol of the O.P.P.

Section 6.2 ('Single Motor Vehicle Accidents by Vehicle Type') clearly reveals that motorcycles are over-represented by two times in single-vehicle accidents.

Section 6.3 shows a correlation of vehicle accidents involving various vehicle types. This is expanded upon in Section 6.4 demonstrating an effort to determine the effect of vehicle size differential on the extent of injuries of occupant. This is more clearly spelled

out in the extent of injury by weight class of vehicle (Section 6.4(a)) with it being obvious that in the majority of collisions, the occupants of the lighter vehicle incur more serious injuries. In 52 of the two-car collisions, for which model names were available, the size (weight) differential contributed to the severity of the injury in 19 or 36.5% of them according to the judgment of the investigating police officer.

These data have already been preceded with other studies, particularly in United States where evidence clearly revealed that smaller cars must be made safer, as we continue to see a growing popularity of smaller cars.

At the February 28th, 1980 press conference of the National Highway Traffic Safety Administration Car Crash Program, a report was made on a crash worthiness rating of motor vehicles. The tests were designed to identify cars which performed better than average and ultimately, it is hoped that a system will be developed which will grade new cars in terms of safety. Ironically of the 32 categories of cars safety-tested, only 4 passed all five tests.

'Roll-over by Vehicle Type' in Section 6.7 shows that the smaller cars under 3,000 lbs. are over-represented in roll-overs with respect to their percentage of the total number of vehicles involved in the Study. Vans also had a higher involvement, as well as pick-up trucks.

Section 6.8 ('Mechanical Equipment and Condition of Vehicle') clearly indicates that mechanical defects of vehicles, other than motorcycles is not a critical factor in traffic accidents.

SECTION 7

ROADWAY-RELATED ACCIDENT FACTORS:

It should be noted that almost 31% of Study accidents occurred at

locations with curves and/or hills. 41% of motorcycle accidents occurred at curve level and curve hill locations with a comparative Study average for these alignments being only 23.4% for all Study accidents.

Poor illumination was mentioned as contributing to the cause of 22 accidents. However, the term 'illumination' was unfortunately not always interpreted as street lighting as was the intention in the Study. Nevertheless, we would suggest that accident locations involving curves and hills should be re-examined to determine adequate lighting, advanced signing and road markings.

Section 7.9 dealing with Fixed Objects reveals the age-old problem of having unyielding and unmerciful street furniture or design. There were 7 fatalities involving rigid poles by street or roadside, with 3 fatalities involving trees by the side of the road. An examination of this schedule indicates that a high percentage of the fatalities involved fixed objects with rigid poles, trees or ditches being the most critical. We would suggest that continuing efforts should be made to create a more forgiving environment e.g. surface-level shoulders; break-away poles; removal of trees if necessary; deceleration slopes or berms, etc. We make some further observations in a supplementary report to the accident schedule itself dealing with road designs and road environment. Inspections of 90 of the 330 accident sites were carried out by Messrs. Lomax and Webster, although not all sites inspected had contributing roadway factors indicated by the investigating officer. It was their judgment that in 29 of the 90 inspections, no roadway factor was judged as contributing to the accident. Despite their suggestion that other sites could have an improvement in roadway design or environment, it may not be practical to carry out these changes because of cost. They did identify 8 accident sites at which roadway factors were judged to make a major contribution to the causes of accidents, so much so that they were deemed primary causes and obviously should have some treatment.

SECTION 8

ENVIRONMENTAL CONDITIONS:

Section 8.2 dealing with daylight and darkness conditions clearly indicates that accidents occurring in hours of darkness are over-represented with respect to exposure to darkness.

SOME FURTHER OBSERVATIONS:

As a result of providing Dr. F. G. H. Baillie, Director of Emergency Services, Chedoke-McMaster Hospitals, with tabulated results of the Accident Study, he has indicated great interest in a follow-up study. We are attaching a copy of his letter of January 7, 1981 to Mr. Robert Webster, Study Coordinator, Hamilton Automobile Club. Previously, Dr. Baillie had indicated the value of looking "at the medical aspects relating to these accidents, to look for any connection between the factors identified by the H.A.C. and the injuries and other medical conditions related to patients involved in these accidents. In addition, this would allow us to exercise and develop a protocol for collecting data related to accidents from charts, etc. to allow for any future proposal relating to accident investigation and trauma management in the Hamilton region." Dr. Baillie went on to say: "We feel this venture should be given support as it has great potential in looking at the true impact of trauma on this community and of further study on the inter-relationship of medical conditions, traffic factors and resulting injuries from road traffic accidents."

We have been advised of continuing efforts of the Regional Ambulance Pre-hospital Care Committee to increase in-service, education and training in emergency pre-hospital patient car related topics. This includes fostering a cooperative team effort between ambulance and

emergency department personnel. The ability of trained personnel to handle traffic accident victims is gaining a higher profile. Particular note was made of the excellent public education work being carried out in the City of Seattle, with a high percentage of the population being trained in CPR (Cardio-Pulmonary Resuscitation). This is an exercise which should be highly commended and promoted. We do know that Dr. Baillie and his colleagues are vitally interested in this aspect of medical care.

The case for additional thought to prevention of traffic accidents is very strong, particularly with recognition that there is a limit to the impact of enforcement and penalties on traffic accident reduction. This is appropriately expressed in an item we are taking the liberty of attaching to this report entitled "The Fence or the Ambulance?" This philosophy covers all aspects of traffic accident prevention, including enforcement, engineering and education.

Creativity and imagination dealing with the traffic accident problem is not the province only of those with technical training or age. Recently, it was reported that a young British student who was inspired by the optical devices used in children's toys, took this idea and created an animated road sign. He applied the device to traffic signs so that one image would flash and then another depending on the angle of light. In effect, he created 'a moving picture' as the motorist approaches. Tests have proven that such moving road signs are more visible to motorists, and France, West Germany, New Zealand and Saudi Arabia have expressed interest in installing them. A worthwhile idea which could have definite benefits.

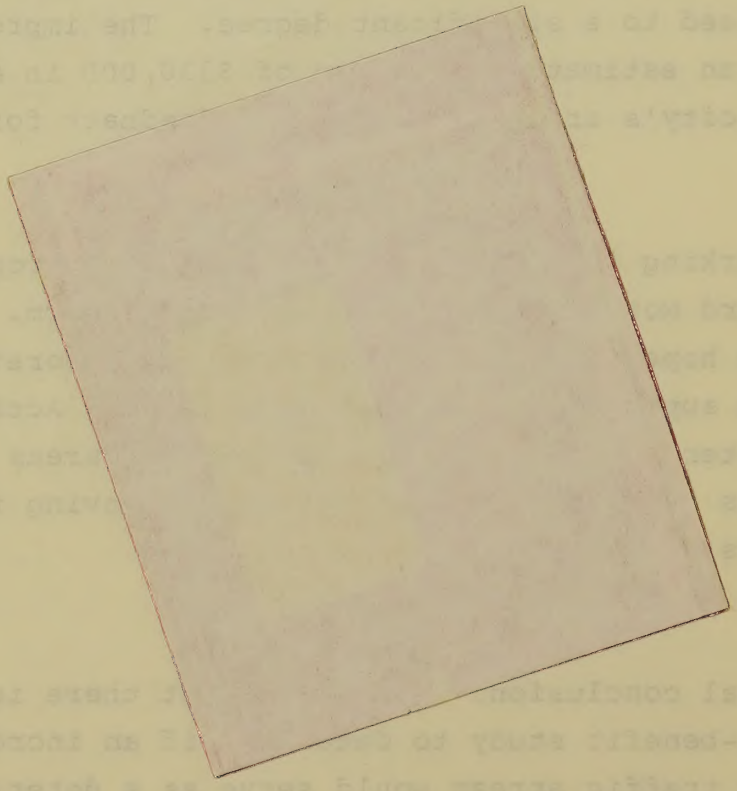
The positive approach to traffic accident reduction is being tested in a variety of areas around the world. For example, in Dartmouth,

Nova Scotia, the motivational or psychological approach is being used, giving drivers positive feedback, with beneficial results. We are enclosing a copy of a press release datelined Halifax, which appeared in the Globe and Mail, September 12th, 1980.

In Milwaukee, a study was undertaken to find out if fewer accidents would happen if streets were more brightly lighted at night. Sodium vapor lights were installed in the model city areas to bring the level of illumination of the street at night to four times the city-wide standard. The comparison of accident records for 3 years prior to the installation and 2 years after indicated the night time traffic accidents decreased significantly, clearly indicating that the more visible pedestrians and cars are, the more likely the driver can stop in time. Night time parked-vehicle accidents also decreased to a significant degree. The improvement, overall, resulted in an estimated reduction of $330,000 in accident costs for the model city's area, a significant feedback for the investment.

Our Working Committee is putting forward proposed revisions to the Standard Motor Vehicle Accident Report Form. These are submitted in the hope that the revised form, incorporating some of the features of the supplementary report used in this Accident Study, can help to better identify some of the problem areas and problem drivers as well as provide opportunities for improving the performance of drivers.

In final conclusion, we propose that there is a need to carry out a cost-benefit study to determine if an increase in police cruisers in our traffic stream would serve as a deterrent and reminder to all motorists of the need to check their driving habits and to obey traffic laws. This will directly address the serious intent to reduce traffic accidents. If the cost-benefit study or even a



test of such action, reveals a cost recovery through lower traffic court costs, lower medical health care costs, and salvage of economic producers, as well as the most basic of all considerations, the saving of life, then it is obvious that appropriate action should be taken to find the necessary funds to accommodate this need.

ACKNOWLEDGEMENT:
We do wish to acknowledge with appreciation, the strong interest of the Solicitor General in the area of traffic enforcement and traffic accident reduction. The Hon. Mr. McMurtry's personal interest, in our opinion, provided a desirable stimulus to traffic personnel in the three Regions involved in the Study. We offer as partial evidence of this, the following comparative traffic accident statistics for Hamilton-Wentworth Region from the time the Study was commenced to the end of the year i.e. May to December.

	May-Dec.'79	May-Dec.'80	Change	% Change
Fatalities	30	24	-6	-20.0
Serious Injuries	304	250	-54	-17.8
Total Injuries	3,496	3,445	-51	- 1.5
Pedestrians Killed	10	9	-1	-10.0
Pedestrians Injured	306	291	-15	- 4.9
Cyclists Killed	4	1	-3	-75.0
Cyclists Injured	158	158	0	0.0
Enforcement Index*	11.9	13.5		

*Enforcement Index reported for the full years of 1979 and 1980.

If the improvements can be related, even indirectly, to the recognition of this vitally important work by the Solicitor General and his concerns, then it does suggest that a continued effort should be made to emphasize with our highly professional police traffic personnel the critical importance of this life-saving work.

McMASTER UNIVERSITY
Department of Family Medicine
1200 Main Street West, Hamilton, Ontario, L8S 4J9
Telephone: (416) 525-9140

January 7, 1981

Mr. Robert Webster
Project Coordinator
Traffic Accident Study
Hamilton Automobile Club
393 Main St. East
Hamilton, Ontario

Dear Sir:

Regarding your letter of the 19th of January and the H.A.C. study overview.

As you know we have developed some considerable interest in this study and through your help in establishing as far as possible the medical aspects related to these accidents. It is estimated that the time period for this would be three months, but we are still waiting a final decision as regards funding of this part of the project. As a result of what has already been collated by yourself, the areas of particular interest must be —

(a) the accidents at night or at dawn or dusk and whether these in any way are related to any visual impairment of the drivers involved;
(b) what psychological or pharmacological (drugs) factors were at play at the time of the accident; whether the compulsory labelling of drugs as regards their possibility in impairing driving should be made mandatory is of some interest but would need much closer scrutiny, both by pharmaceutical companies and societies, the medical profession, and particularly the Solicitor General.
(c) the severity of injuries encountered in this study and the relationship of wearing or not, seatbelts. We would be particularly interested in the relationship of seatbelts' uses to the incident of deaths.
(d) the effect of the time of the accident on the outcome assuming similar severity of injury and whether this time factor is important in quality of care. This does not only involve the absolute time but also the individual times involved in mobilizing emergency services and taking the patient to the definitive care unit. Some of the medical profession feel very strongly that a higher level of general public knowledge in first aid would do much to decrease morbidity and mortality, particularly the latter in road traffic accidents and only with this higher quality of public first aid knowledge would it appear worthwhile to introduce the possibility of advance life support (paramedic) services.
(e) the role of medical defects in traffic accidents is at present a contentious one. However, hopefully this study might identify those patients where such a warning may be of value and where even the reporting of these individuals to the M.T.C. would be necessary.

(f) the compulsory requirement of doctors or hospitals to provide the police with blood alcohol levels in injured patients is highly contentious, particularly today when the public and the legal profession are becoming so interested in litigation, etc. and the anxieties of confidentiality. However, the C.M.A. at this year's meeting did indicate a move towards a more positive step being taken by physicians in identifying those patients who may have been drinking and thereby putting other members of the public at risk. This area needs to be more thoroughly reviewed, not so much at the local level but particularly at the provincial level and we would look forward to guidance from the Solicitor General and the medical profession and the public as regards this.

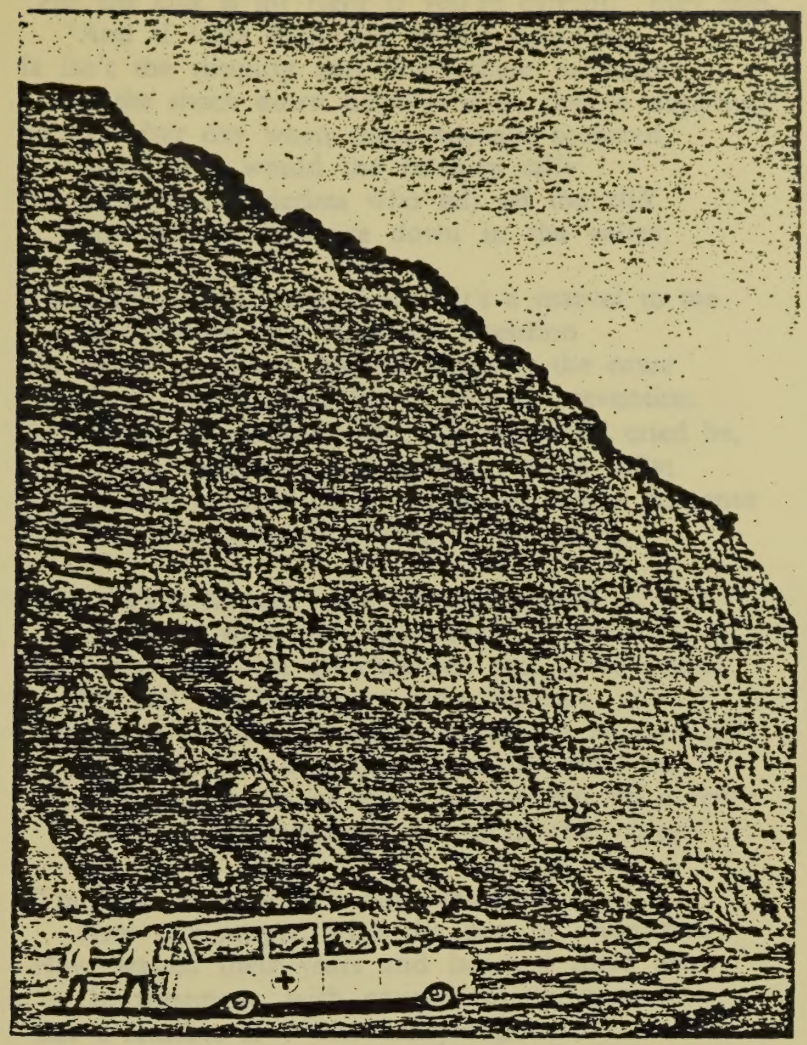
(g) the possibility of accidents occurring and not being reported to the police force can only be resolved through discussions with the police force per se because the number of accidents seems relatively small and may not be worth the amount of time taken for such a project.

Finally, our main area of interest is to identify how many and the degree of severity of injuries sustained in road traffic accidents in this area, to identify the impact on the health service of these patients, and to identify strengths and weaknesses in the health service in relationship to outcome of the injuries sustained by these patients. It is this activity from the medical review we feel is of some importance to identify any weaknesses which can be corrected, thereby improving service to the public.

Yours sincerely

F.G.H.Baillie, M.B., Ch.B., F.R.C.S.(c)
Director, Emergency Services
Chedoke-McMaster Hospitals

FGHB:CA



The Fence or The Ambulance?

'Twas a dangerous cliff, as they freely confessed,
Though to walk near its crest was so pleasant:
But over its terrible edge there had slipped
A duke and many a peasant.
So the people said something would have to be done,
But their projects did not at all tally:
Some said, "Put a fence round the edge of the cliff,"
Some, "An ambulance down in the valley."

But the cry for the ambulance carried the day,
For it spread to the neighboring city;
A fence may be useful or not, it is true,
But each heart became brimful of pity
For those who had slipped o'er that dangerous cliff,
And the dwellers in highway and alley
Gave pounds or gave pence, not to put up a fence,
But for an ambulance down in the valley.

"For the cliff is all right if you're careful," they said,
"And if folks even slip or are dropping,
It isn't the slipping that hurts them so much
As the shock down below — when they're stopping."
So day after day when these mishaps occurred,
Quick forth would the rescuers sally
To pick up the victims who fell off the cliff
With their ambulance down in the valley.

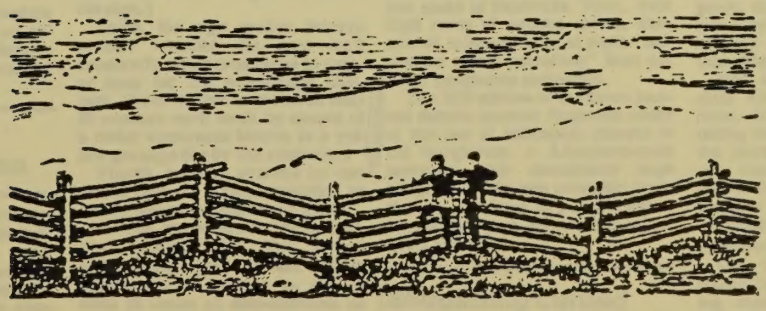
Then an old man remarked: "It's a marvel to me
That people give far more attention
To repairing *results* than to stopping the *cause*
When they'd much better aim at prevention.
Let us stop at its source all this mischief," cried he,
"Come, neighbors and friends, let us rally;
If the cliff we will fence, we might almost dispense
With the ambulance down in the valley."

"Oh, he's a fanatic," the others rejoined,
"Dispense with the ambulance? Never!
He'd dispense with all charities, too, if he could:
No, no! We'll support them forever.
Aren't we picking up folks just as fast as they fall?
And shall this man dictate to us? Shall he?
Why should people of sense stop to put up a fence
While their ambulance works in the valley?"

Thus this story so old has beautifully told
How our people, with the best of intentions,
Have wasted their years and lavished their tears
On treatment, with naught for prevention.
But a sensible few, who are practical, too,
Will not bear with such nonsense much longer;
They believe that *prevention* is better than *cure,*
And their party will soon be the stronger.

Encourage them, then, with your purse, voice, and pen,
And (while other philanthropists dally)
They will scorn all pretense, and put up a stout fence
On the cliff that hangs over the valley.

— *Joseph Malines.*



How much we are like our English cousins! In Joseph Malines' poem, these good people generously provided an ambulance at the foot of the cliff, while neglecting to build a fence at the top to prevent such disastrous mishaps from occuring. By building massive hospitals for OUR sick and afflicted, and gigantic institutions for the mentally ill, while neglecting the BASIC CAUSE of our physical and mental disabilities, we, here in America, seem to be following in the footsteps of our British neighbors.

THE GLOBE AND MAIL, September 12, 1980.

Psychological approach

Signs tell drivers how good or how bad they've been

By BARBARA YAFFE
Globe and Mail Reporter

HALIFAX — A special road sign on several highways leading into Dartmouth has resulted in a dramatic decrease in speeding and traffic accidents.

The sign gives drivers feedback on the percentage of people who, the previous week, obeyed the speed limit posted nearby. It was devised by Ronald Van Houten, a psychologist acting as a consultant to the Dartmouth Police Department.

Mr. Van Houten says police only recently have begun relying on psychologists for tips on more effective law enforcement techniques.

He pointed to recent articles in the Journal of Applied Behavior Analysis that outline test results of several techniques used by various police forces in Canada and the United States.

For example, psychologists found special signs used in an experiment in a Tennessee department store virtually eliminated shoplifting.

Helicopters help to reduce burglaries

In another experiment, psychologists evaluated the effectiveness of increased police patrols and deemed them to be almost useless in cutting burglary, especially during daylight hours, unless done by means of a low-flying helicopter.

Mr. Van Houten, chairman of the psychology department at Mount Saint Vincent University, visited the Dartmouth police force about two years ago to propose the use of his highway sign aimed at reducing speeding in areas of the city with the worst speeding problems.

The sign, now posted in three locations, has resulted in a 50 per cent reduction in speeding, a 57 per cent reduction in accidents and an 88 per cent reduction in non-medical accident-related costs.

The large white signs are posted where highways narrow into Dartmouth streets and speed limits drop from 80 to 50 kilometres an hour (50 mph to 30 mph). They state the percentage of drivers not speeding during the past week. Below that figure appears the best percentage achieved so far.

Why does it work?

First, it's a reminder to slow down.

Second, the sign probably appeals to a community spirit of a few drivers who watch for the recorded numbers and want to do their bit to boost the best percentage. People appear to be keeping track of the numbers because effectiveness drops off unless they're changed weekly. (Speeding also shoots up when a tarpaulin covers the sign.)

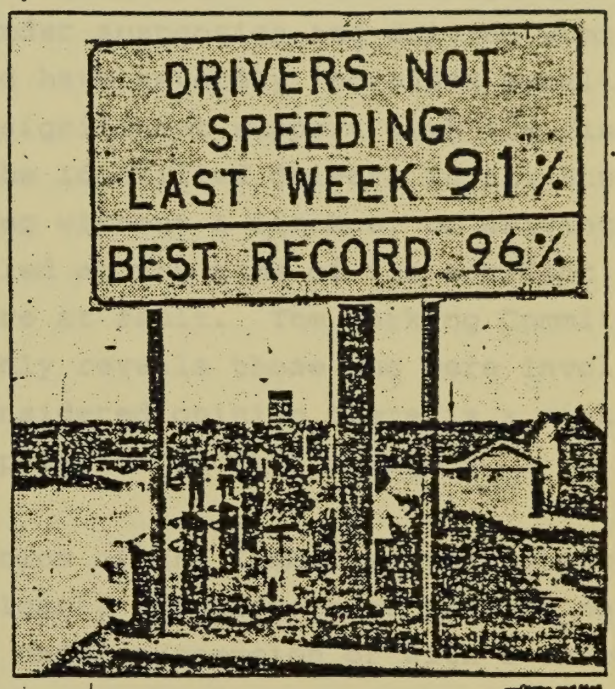
Third, the sign makes drivers wonder whether the area isn't constantly being monitored to gather data for the percentage postings. (Information is gathered only 20 minutes each week by means of a radar apparatus hidden in a yellow garbage bin by the roadside.)

Fourth, braking activity by one driver sets off a chain reaction as others notice the red brake lights.

Calling the program "an unqualified success," Mr. Van Houten noted these signs — in use only in Dartmouth at present — are at least 10 times as cost-effective as high-visibility police patrolling and ticketing. Parked police cars slow driving speeds — to a crawl in most cases, he said — but their effectiveness extends only three miles on either side of the patrol car.

A study of police patrols in the spring, 1977, edition of the Journal of Applied Behavior Analysis shows increased police reinforcements, particularly for daytime patrol, result in "either zero or marginal crime deterrent effects." The study, carried out in four patrol zones of Nashville, Tenn., with high rates of serious crime, concluded, however, that at night "saturation police patrolling" does cut down burglaries somewhat.

The 1978 edition of the same journal details another Nashville study of the use of helicopter patrols to cut burglaries. A 5.6-square-mile territory with chronically high burglary levels was patrolled from the air, resulting in a reduction of burglaries from an average of 5.1 to 2.2 a week.



—Globe and Mail

Psychological sign gives drivers some positive feedback.

Shoplifting curbed by proper signs

In another experiment, psychologists found that shoplifting can be "virtually eliminated" by posting signs on merchandise stolen most frequently.

The management of a department store in Murfreesboro, Tenn., found anti-shoplifting signs appeared to reduce but not eliminate theft. But shoplifting was decreased to near zero when signs were placed directly on certain goods, stating: 'Attention shoppers and shoplifters: the items you see marked with a red star are items that shoplifters frequently take.'

Why does this work? Psychologists offer two possible explanations. Store employees might be taking the merchandise and realize the increased threat of apprehension when they see the identification of the goods they're taking. Or perhaps potential shoplifters are deterred by an increased threat of apprehension.

Mr. Van Houten said experiments last year in Dartmouth using roadside signs to encourage seatbelt use proved futile. The signs, like the speeding signs, stated the percentage of drivers wearing seatbelts and also gave the best percentage.

The psychologist said the signs didn't work because the drivers could not immediately buckle up upon reading the percentages. In addition, the chain-reaction factor wasn't operative; drivers couldn't see other drivers buckling up.

PRIMARY RECOMMENDATIONS

1. DRIVING WITHOUT A LICENCE:

The Study revealed the seriousness of accident involvement by improperly licenced drivers or drivers driving while under suspension or with a cancelled licence. Current penalties for such actions may be deemed appropriate for those driving with an improper licence e.g. a person holding an auto licence but on a motorcycle, but it is strongly recommended that those who are blatantly violating the law while driving while under suspension and driving when licence has been cancelled, should have severely increased penalties applied. This proposal is given significant support with the findings in the Study that 12.1% of the identified drivers in the Study were not properly licenced, driving without a licence, or driving while licence suspended or cancelled at the time of the accident and that over 90% of these drivers were at fault. The Working Committee advises that the Accident Study only reveals those who were involved in an accident but it is their considered opinion there is a significant percentage of the driving population in this category.

It is also the considered opinion of the Committee that photographs on driving licences will clearly identify those persons not having a licence or driving while under suspension or with a cancelled licence, attempting to use a 'borrowed' licence. It is not within the province of the Study Committee to determine how funding for this added cost for a driver's licence would be accommodated.

2. MAKING LICENCE SUSPENSIONS EFFECTIVE:

Examination of the statistical data of the Study and particularly Section 2.12 'Analysis of Driver Records', will reinforce the recommendation that where a suspension of licence is handed down by the Court and then subject to appeal, that the suspension commence from the date the conviction is upheld. At the present time it is possible for a person to appeal a conviction of licence suspension and have the conviction upheld but at that time there may be only a

few days left of the proposed original suspension. Further, before licences are returned after suspension, that a re-test of the driver be required.

3. ALCOHOL AND DRUGS:

The report clearly indicates that alcohol and drug involvement is still a very critical problem. It is felt that the alcohol involvement in the fatal accidents may be under-represented because in some instances, injured traffic victims are rushed to the hospital and there is no possibility of determining the alcohol impairment level at time of accident. It is suggested that some consideration be given to requiring that a blood sample be immediately provided to the local Police Department for injury admissions to the hospital as a result of a motor vehicle accident. Significant throughout the Study is the increased proportion of younger people having alcohol impairment and involved in motor vehicle accidents. Of additional concern is the changing pattern of pedestrian alcohol involvement. At one time this applied to senior pedestrians, but our Study shows that alcohol in 16 to 19 year old pedestrians was involved in 4 of the 7 alcohol related pedestrian accidents. For this reason it is strongly proposed that consideration be given to again raising the legal drinking age level to a more mature adult level i.e. age 21. In a further determined effort to combat the results of alcohol impaired drivers, the MTC undertake studies similar to those carried out in New Jersey for increasing the width of lane markings and road edge markings with beneficial results. It is strongly recommended that the Solicitor General's Department consider the implementation of a Driving While Impaired (DWI) Counterattack Program so successfully carried out in other jurisdictions in North America. These are Clinics, established under government sponsorship, to which those charged with driving while impaired or having an excess amount of alcohol in the blood stream, would be directed by the Courts. These Clinics do not attempt to sermonise but rather deal pragmatically with the consequences of drinking and driving and can result in referrals to

agencies which can provide additional assistance to these drivers. This would apply a businesslike maxim of attempting to deal with the source of the problem rather than cope with the results of the problem.

In our Review and Observations of the Study we reported that 'Pharmacy Drugs' are of great concern. For this reason we are strongly recommending that all 'Pharmacy Drugs' which can impair driving ability, be clearly labelled with a warning, such as those appearing on tobacco products. Additional work must be carried out in identifying and determining the critical nature of 'street drugs' on driver behaviour.

4. BICYCLES:

With the growing popularity of bicycles in our traffic stream, impetus must be given to the critical need to conduct public information programs on the importance of proper sharing of the roadway by bicycles and motor vehicles. Furthermore, the Study Committee strongly supports the submissions previously made to the Provincial Government by the Canadian Standards Association and the Ontario Traffic Conference dealing with bicycle equipment and bicycle handling. An increasing number of bicycle accidents are occurring during hours of darkness, emphasizing the strong proposition that all road bicycles should be adequately equipped for both night and day driving including reflectors and lighting. Further, there has been a suggestion that with the increased popularity of multi-speed bicycles capable of travelling at high rates of speed, consideration should be given to requiring licences for such vehicles similar to the separate licence classification required for motorcycles. In the report we indicate that bicycle injuries are another of those classifications that we believe are under-represented in the report Study because of the number of children injured on bicycles being taken directly to the Emergency Department of Hospitals without a report being placed with the Police Dept. The purpose of submitting these proposals on bicycles, is that market

indications clearly project increased usage of bicycles, particularly for urban use, similar to the popularity enjoyed in Europe for many years and, currently there are marketing reports that within the next two years or so, covered aerodynamically designed pedal pushers will be on the market and having appeal to an increasing number of people.

5. MEDICAL ASPECTS OF THE PROBLEM:

Driver medical condition warrants much more extensive examination than that provided in the Study and for this reason we would strongly support the proposal by Dr. F. G. H. Baillie, Director of Emergency services, Chedoke-McMaster Hospitals, that he and his colleagues at McMaster Medical Centre undertake a follow-up study of the medical aspects relating to the accidents contained in the Study. Hopefully the Study would allow for the development of a protocol for collecting data for future accident investigations and trauma management.

It is strongly recommended there be re-examination of the current requirements of physicians to report known medical problems of patients that could impair their driving ability, in a manner that would make it a more workable procedure than exists at the moment, so that doctors would be relieved of the problem of judging between the rights of the patient and the rights of society and at the same time be assured of confidentiality.

6. DRIVER RETESTING:

Driver ability and knowledge should be given special study by the Solicitor General's Department in concert with the Ministry of Transportation and Communications since it is acknowledged that driving is a complex task. It is suggested that serious consideration be given to re-checking the knowledge and awareness of drivers with psychophysical testing (reflex and visual ability) and a written test of traffic laws, signs, signals and markings every third licence renewal period i.e. every nine years. Because

of the cost of undertaking a complete driver re-examination every nine years, only those experiencing difficulty with the psycho-physical testing and the written test, should be required to undergo a driver test.

7. DRIVER EDUCATION, INFORMATION AND MOTIVATION:

More consideration must be given to motivating and stimulating drivers to do a better job through the so-called use of 'the carrot'. Much can be learned from 'in-house' industrial plant safety programs and applied to traffic accident prevention work. Reference should be made to features of the Study Observations but in particular, it is strongly recommended that the Solicitor General consider the establishment of government-sponsored Clinics, similar to those now operated in the Province of Alberta, to permit drivers suffering a demerit point loss to recapture some of these points at least once a year. This would be a positive, stimulative step to encourage good drivers to continue to be good drivers even though they may have suffered some demerit point losses. It will also serve to act as a re-education of traffic laws and an awareness of the traffic accident problem.

Further, it is recommended that in assigning funds for traffic safety and traffic safety education, that serious thought be given to developing programs which can be administered at regional and local levels through the use of local personalities and traffic and police officials. It is our considered view that personalizing these programs, of a positive nature, stand a greater chance of being well received rather than the professional institutional type of promotions carried out in other fields of accident prevention.

8. VISIBLE AND EFFECTIVE TRAFFIC ENFORCEMENT:

Highly visible traffic enforcement continues to be the key to traffic accident prevention. For this reason we are strongly recommending that there be a cost-benefit study carried out by the Solicitor General's Department to determine the results of increas-

ed visibility of police cruisers in our traffic stream and including increased traffic enforcement during the critical late hours of darkness. A cost-benefit study would determine whether there is a legitimate cost recovery through the lower traffic court costs, lower medical health care costs and a salvage of economic producers as well as the most basic of all considerations, saving of life.

In company with this recommendation, there must be visible evidence by senior government agencies that they recognize the critical importance of traffic enforcement and traffic accident prevention work. This recognition, in our opinion, reflects to a degree, the improved accident results occurring in the study areas from the time the Study was undertaken, with particular appreciation for the direct interest by the Solicitor General in this life-saving work.

9. REVISIONS TO MOTOR VEHICLE ACCIDENT REPORT FORM:

Revisions to the standard Motor Vehicle Accident Report form are being proposed in this Study in the hope that by incorporating some of the features of the supplementary report used in the Accident Study, there will be a better identification of problem areas and problem drivers, as well as providing opportunities for improving the performance of drivers.

SUPPLEMENTARY RECOMMENDATIONS

1. MOTORCYCLES:

Because motorcycle accident fatalities were over-represented in the Study group, we would suggest there be a special study of the motorcycle problem as reflected in the Study, with particular attention to the need for proper licencing and hopefully some efforts to ensure adequate training before licencing occurs so as to understand the difficulty of vehicle handling, particularly on curves and hills. The Study further reinforces the current Ontario Law requiring helmets to be worn by motorcycle drivers and operators and we strongly recommend that this Law be retained.

2. PEDESTRIANS:

Accidents involving pedestrians continues to be a critical factor and we would specifically refer to hazards to pedestrians at intersections caused by left turning vehicles. Section 2.6 of our report indicates the problem of visibility block-out from the left roof support when making a left turn manoeuvre. This is aggravated in the wintertime with an increase in diameter of the blind spot with snow accumulation or grime not covered by windshield wipers. Both motorists and pedestrians should be strongly cautioned about this problem. We would note our concern of the changing pattern of pedestrian injuries and fatalities in terms of age category. At one time the critical categories were the very young or very old, but our Study indicated that the most significant age group is now the 15 to 19 year olds, suggesting perhaps some educational work could be carried out in the high schools. At the present time much of the traffic safety education work is carried out in elementary schools only, with very limited, if any, traffic safety work being carried out in the high schools.

3. TRAFFIC LIGHT OBSERVANCE:

Traffic light observance was another factor of concern, particularly the running of amber lights. For this reason, it is strongly

recommended that all enforcement agencies direct their attention to this infraction and additionally, with the public to be clearly reminded that a steady amber light at a signalized intersection represents a stop signal unless the stop can not be made in safety.

4. ROAD AND HIGHWAY DESIGN:

Road and highway designs hopefully will be given greater attention by the MTC and Traffic Engineering Departments. There is a need to give this serious consideration in view of the fact that 31% of the accidents occurred on curves and 41% of motorcycle accidents occurred on curves and hills. Action should be taken, within fund availability, to improve alignment, signing and/or illumination. Milwaukee proved that there can be a cost-benefit recovery by this action through improved illumination of an urban area. Continued efforts must be made to making the roadway environment a more forgiving environment, e.g. through removal of fixed objects, use of break-away poles, etc.

5. VEHICLE MIX BECOMING CRITICAL:

Vehicle mix in the traffic stream indicates this is becoming more and more of a problem e.g. bicycles, motorcycles, small cars, large cars, vans, larger trucks, etc., all attempting to share the same travel corridor. With some vehicles becoming larger and the vast majority becoming smaller, it is evident that the smaller vehicles will have to be carefully designed in terms of crash worthiness. We would recommend that the Provincial Government review with the Federal Government the feasibility of establishing a system which will grade new cars in terms of safety including safety from impacts and rollovers.

Further, with the growing popularity of vans as a passenger vehicle as well as an R.V. vehicle, there is a need to include in our Driver Training programs and our educational programs, caution regarding the blockage of visibility caused by vans in the traffic stream.

PROPOSED REVISIONS TO THE MOTOR VEHICLE ACCIDENT REPORT FORM

PURPOSE:

The purpose in recommending revision to the MVA form is to increase the utility of statistical data to police, traffic engineering departments, traffic accident researchers and other concerned agencies. It is hoped that a revised form would allow police officers, in completing the form, to be more specific in defining factors that contributed to the cause(s) of the accident.

1. There is a real need to clearly define what constitutes an 'accident'. A decision must be made on what kind of accidents should be reported on the MVA form and the Form title should be worded to conform to the intent of this decision. As a suggestion, delete the words 'Motor Vehicle' from the Form title 'Motor Vehicle Accident Report' and replace with the word 'Traffic'. This would allow accident reports to be filed for personal-injury traffic accidents in which no 'motor vehicle' as currently defined was involved.

2. Add 'Vehicle Model' to the section on vehicle information. When the precise vehicle model is known, size of the vehicle and its design features can be determined. The model name would also aid in the identification of the vehicle.

3. Space on the MVA form is required to qualify the 'Yes or No' check-off for 'Lic'd to Drive' with a more adequate description of licence status -- suspended, expired, cancelled, improper class, etc. These specific licence status descriptions could be outlined for the police officer's benefit in the "Ontario Manual on Classification and Reporting of Motor Vehicle Accidents".

4. Replace the section title 'Visibility' with 'Weather'. Clear, Rain, Snow, Sleet, Fog, Mist and Smoke are all weather conditions that do not necessarily relate to visibility. (See Recommendation 9 regarding Visibility).

5. Exclude the section entitled 'Accident Involves Moveable Object'.

The information is redundant since it can be ascertained from other information on the MVA report.

6. The term 'Approaching' under the section 'Initial Impact Type' should be better defined so that it accurately reflects the impact. The 'Initial Impact Type' in pedestrian accidents is normally termed 'approaching'. 'Approaching' is also used for head-on collisions. These are two totally different impact types and should be properly differentiated. Perhaps if the word 'Pedestrian' were added to the list of impact types the problem would be solved.

7. Some of the actions in the 'Apparent Driver Action' section are too general and do not relate specifically to the accident causing action.

   Consequently the 'Apparent Driver Action' section should include this revised list of actions:

APPARENT DRIVER ACTION

Driving Properly
Following Too Close
Speed Too Fast
Improper Turn
Fail to Yield Right of Way (specify circumstances)
Disobey Traffic Signal
Disobey Stop Sign
Improper Passing
Wrong Way on One-Way Road
Lost Control (specify reason)
Dangerous Manoeuvre (specify)
Other (specify)
Not Known

(space for specifications)

The various circumstances under Fail to Yield Right of Way are outlined in the 'Ontario Manual On Classification and Reporting of Motor Vehicle Accident'.

8. The MVA Report Form does not include any detail of 'Street Illumination' or 'Road Lighting'. Noticing the over-representation of accidents in darkness and the relatively high number of accidents occurring in urban areas, Road Lighting certainly should be a recognized factor in the MVA Report.

   Consequently the following section on Road Lighting should be added to the MVA Report Form.

   ROAD LIGHTING
   Good
   Poor
   Non Existent
   Accident Occurred In Daylight

9. Visibility is also not adequately detailed in the MVA Report Form. Since this factor frequently contributes to the cause of an accident it should not be overlooked. By entitling the section 'Visibility Impaired or Blocked By' contribution to the cause of the accident is implied. The list of visibility-impairing conditions is based on the basket list of factors obtained in the Study.

   VISIBILITY IMPAIRED OR BLOCKED BY
   Darkness
   Rain
   Snow, Sleet
   Fog, Mist, Smoke
   Glare from Sun
   Glare from Oncoming Headlights
   Other Vehicles (specify)
   Fixed Object (specify)
   Road Alignment

Vehicle Condition (specify)
Other (specify)

(space for specifications)

Examples of the various specifications should be outlined in the "Ontario Manual on Classification and Reporting of Motor Vehicle Accidents".

10. It was the concensus of the Study Committee that valuable 'observation information' was contained in the Supplementary Accident Report Form used in the Study. That is, the investigating officer should be required to comment on what factors in his opinion contributed to the cause of the accident or to the severity of injuries. It was felt that in order to obtain an unbiased opinion, the officer must be convinced of the confidentiality of his opinions and this section be treated as privileged information.

The MVA Report Form simply describes circumstances, conditions and results of the accident and does not endeavour to define 'causes of accidents'. Since the goal of any accident investigation is to determine the causes of the accident, it is deemed desirable to have this information.

Such causal information would be invaluable to police in developing effective traffic safety programs. Police could also monitor these causes and adjust their enforcement programs accordingly. While ensuring the confidentiality of the officers' opinion, the police could provide valuable information which could be transmitted to other agencies such as traffic engineering departments, hospitals and auto manufacturers and be an aid to government ministries directly involved in traffic accident prevention work.

In order to capture all this causative information a detachable section should be added to the MVA Report Form. This section must include the accident number so that it can be cross-referenced to the main portion of the form after detachment. This new

section should contain a clear declaration of the confidentiality of information and perhaps a statement of purpose for the information could also be included. The instructions might read as follows:

> Recognizing that most traffic accidents are caused by a combination of factors related to the driver, the vehicle, the roadway and the environment, list and explain the factors that in your opinion contributed to the cause of the accident or to the severity of injuries.

TRAFFIC ACCIDENT STATISTICAL DATA

Section 1 - General Accident Information

1.1 Number of Accidents and Involved Persons in Study

1.2 Number of Accidents by Region

1.3 Occurrence by Day of Week

1.4 Occurrence by Hour of Day

1.5 Kind of Accident

1.6 Non-Collision Event

1.7 Initial Impact Type

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2.1 Extent of Injury by Class

2.2 Extent of Injury by Safety Equipment Use

(a) Distribution of Extent of Injuries for Each Safety Equipment Use

(b) Percentage Distribution of Extent of Injuries for Each Safety Equipment Use

2.3 Extent of Injury of Ejected Persons

2.4 Age and Sex of Drivers

2.5 Drivers and Accidents Involving Improperly Licenced Drivers

(a) Licence Status

(b) Regional Location

(c) Age of Improperly Licenced Drivers

(d) Vehicle Driven by Improperly Licenced Drivers

(e) Alcohol Contribution to Causes of Accidents For Improperly Licenced Drivers

(f) Selected Driver Actions of Improperly Licenced Drivers

(g) Charges Laid Against Improperly Licenced Drivers

2.6 Vehicle Manoeuvre

2.7 Driver Action and Driver Condition

2.8 Lost Control

2.9 Visibility

2.10 Characteristics of Accidents in Which Alcohol Was Judged Contributory to the Cause by the Investigating Police Officer

(a) Alcohol and Drugs

(b) Alcohol Involvement in Fatal Accidents Only (all Classes of Victims)

(c) Age by Class of Victim for Accidents Involving Alcohol

(d) The 16-24 Age Group of Alcohol-Involved Persons

(e) Selected Driver Actions of Alcohol-Involved Drivers

(f) Charges Laid Against Alcohol-Involved Drivers

(g) Records of Alcohol-Involved Drivers

2.11 Charges Laid Against Study Drivers

2.12 Analysis of Driver Records

(a) Purpose

(b) The Records

(c) Classification System of Driver Records

(d) Illustration of Classification System of Driver Records

(e) Rationale for Classification System of Driver Records

- Criminal Code of Canada (CCC) Convictions
- Suspensions
- Highway Traffic Act (HTA) Convictions

(f) Record Class of At-Fault and No-Fault Drivers

(g) Record Class of Alcohol-Involved Drivers

(h) Record Class by Age of Driver

(i) Record Class of Drivers Who 'Lost Control'

(j) Record of Drivers Who 'Failed to Yield Right-of-Way (R.O.W.)'

(k) Record of Drivers Who 'Disobeyed a Traffic Signal or Stop Sign'

(l) HTA Offences That Do Not or No Longer Contribute to the Current Demerit Point Total By Record Class of Driver

(m) Current Demerit Points and Other HTA Offences

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3.1 Occurrence by Region

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3.3 Occurrence by Day of Week

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3.5 Age of Motorcycle Drivers

3.6 Alcohol Involvement in Motorcycle Accidents

3.7 Driving Record of Motorcyclists

3.8 Fault in Motorcycle Accidents

3.9 Motorcyclist Action

3.10 Vehicle Defect - Motorcycles

3.11 Roadway Factors

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4.2 Occurrence by Month

4.3 Occurrence by Day of Week

4.4 Occurrence by Hour of Day

4.5 Age of Bicyclists

4.6 Fault in Bicycle Accidents

4.7 Bicyclist Action

4.8 Vehicle Defect - Bicycles

4.9 Roadway Factors

4.10 Other Bicycle Accident Facts

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5.2 Occurrence by Month

5.3 Occurrence by Day of Week

5.4 Occurrence by Hour of Day

5.5 Age of Pedestrians

5.6 Driver Visibility Impaired or Blocked in Pedestrian Accidents

5.7 Fault in Pedestrian Accidents

5.8 At-Fault Pedestrian Action and Age of Pedestrian

5.9 Pedestrian Condition

5.10 Vehicle Factors in Pedestrian Accidents

5.11 Roadway Factors in Pedestrian Accidents

5.12 Other Pedestrian Accident Facts

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6.1 Types of Vehicles Involved in Study Accidents

6.2 Single Motor Vehicle Accidents by Vehicle Type

6.3 Two-Vehicle Accidents by Vehicle Type

6.4 Size of Passenger Cars in Two-Vehicle Accidents

4.2 Occurrence by Day of Week
4.4 Occurrence by Hour of Day
4.5 Age of Bicyclists
4.6 Fault in Bicycle Accidents
4.7 Bicyclist Action
4.8 Vehicle Defect - Bicycle
4.9 Roadway Factors
4.10 Other Bicycle Accident Facts

Section 5 - Characteristics of Pedestrians and Pedestrian Accidents
5.1 Occurrence by Region
5.2 Occurrence by Month
5.3 Occurrence by Day of Week
5.4 Occurrence by Hour of Day
5.5 Age of Pedestrians
5.6 Driver Visibility Impaired or Blocked in Pedestrian Accidents
5.7 Fault in Pedestrian Accidents
5.8 At-Fault Pedestrian Action and Age of Pedestrian
5.9 Pedestrian Condition
5.10 Vehicle Factors in Pedestrian Accidents
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5.12 Other Pedestrian Accident Facts

Section 6 - Types of Vehicles Involved and Relationships
6.1 Types of Vehicles Involved in Study Accidents
6.2 Single Motor Vehicle Accidents by Vehicle Type
6.3 Two-Vehicle Accidents by Vehicle Type
6.4 Size of Passenger Cars in Two-Vehicle Accidents

(a) Methodology for Determination of Weight Class of Vehicle

(b) Extent of Injury by Weight Class of Vehicle

6.5 Selected Vehicle Mix and Extent of Injury

6.6 Ejection by Vehicle Type

6.7 Rollover by Vehicle Type

6.8 Mechanical Condition of the Vehicle

Section 7 - Roadway-Related Accident Factors

7.1 Road Surface Condition

7.2 Road Surface

7.3 Speed Limit on Principal Road of Accident

7.4 Road Location

7.5 Pavement Marking

7.6 Traffic Control

7.7 Road Alignment

7.8 Illumination

7.9 Fixed Objects

7.10 Accident Site Inspection Program

7.11 Road Design and Road Environment Factors

Section 8 - Environmental Conditions

8.1 Weather

8.2 Daylight

TRAFFIC ACCIDENT STATISTICAL DATA

SECTION 1 - GENERAL ACCIDENT INFORMATION

1.1 NUMBER OF ACCIDENTS AND INVOLVED PERSONS IN STUDY

Number of:	Accidents	- 330
	Drivers	- 514
	Passengers	- 319
	Pedestrians	- 57
	Involved Persons	- 890

1.2 NUMBER OF ACCIDENTS BY REGION

	Fatal	Hospital Admission	Total
Niagara	15	143	158
Hamilton-Wentworth	13	89	102
Halton	11	59	70
Total	39 *	291	330

*There were 46 fatalities in the 39 fatal accidents.

1.3 OCCURRENCE BY DAY OF WEEK

Monday	- 28
Tuesday	- 42
Wednesday	- 31
Thursday	- 37
Friday	- 66
Saturday	- 65
Sunday	- 61
Total	330

It is a well established trend that accidents occur most frequently on Friday and Saturday. The high Sunday figure can be attributed to early Sunday morning (functionally Saturday night) accidents.

1.4 OCCURRENCE BY HOUR OF DAY

Hour	Number	Fatalities	Hour	Number	Fatalities
00:00-00:59	21	5	12:00-12:59	12	5
01:00-01:59	19	2	13:00-13:59	8	
02:00-02:59	13	3	14:00-14:59	15	2
03:00-03:59	2		15:00-15:59	15	1
04:00-04:59	3		16:00-16:59	20	
05:00-05:59	4		17:00-17:59	31	3
06:00-06:59	2		18:00-18:59	18	1
07:00-07:59	1	1	19:00-19:59	15	1
08:00-08:59	7	1	20:00-20:59	14	1
09:00-09:59	5		21:00-21:59	22	3
10:00-10:59	4	1	22:00-22:59	21	4
11:00-11:59	7	2	23:00-23:59	16	3

The single most frequent hour for serious accidents was 5-6 p.m. There was also a significant number of accidents from 9 p.m. to 3 a.m. -- the so-called 'drinking' hours. These hours also correspond to hours of darkness.

1.5 KIND OF ACCIDENT

	#	%	# Fatal Accidents
Single Vehicle	113	34.2	15
Two Vehicles	153	46.4	13
Three or More Vehicles	12	3.6	3
Pedestrian	52	15.8	8
Total	330	100.0	39

Fatal collisions are moderately over-represented in single vehicle accidents compared to two vehicle accidents.

1.6 NON-COLLISION EVENT

	#	# Related Fatalities
Roll Over	34	6
Fire/Explosion	2	0
Submersion	1	2
Hit-and-Run	11	1
Driver Unfamiliar With Road	3	1
Passenger Falls Out	2	1
Total	53	11

In the 11 Hit-and-Run accidents the suspect driver was apprehended on 4 occasions. The Hit-and-Runs included 4 pedestrian and 3 bicycle accidents.

1.7 INITIAL IMPACT TYPE

Initial Impact Type	Number	%	# Fatal Collisions	% Fatal Collisions
Rear End	33	10.0	3	7.7
Angle	83	25.2	6	15.4
Turning Movement	22	6.7	3	7.7
Sideswipe	16	4.8	2	5.1
Approaching (Pedestrian)	31	9.4	4	10.3
Approaching (Head-On)	30	9.1	4	10.3
Single Vehicle	105	31.8	15	38.5
Person Falls Off	3	0.9	1	2.6
Vehicle Rolls Back	2	0.6	0	0.0
Unknown	1	0.3	0	0.0
No Impact	3	0.9	1	2.6
Other	1	0.3	0	0.0
Total	330	100.0	39	100.0

No clear trend can be established as to the relative severity of each impact type. However, single vehicle and angle impacts are by far most frequent.

SECTION 2 - DRIVER-RELATED ACCIDENT FACTORS

2.1 EXTENT OF INJURY BY CLASS

	Fatal	Major	Minor	Minimal	None	Unknown	Total
Drivers	10	105	75	45	168	7	410
Passengers	11	62	71	47	109	1	301
Pedestrians	8	30	16	1	2	0	57
Motorcyclists*	10	39	22	5	3	1	80
Bicyclists**	7	19	10	0	0	0	36
Other	0	0	0	0	6	0	6
Total	46	255	194	98	288	9	890

* Includes motorcycle passengers and a moped driver.

** Includes two tricyclists.

2.2 EXTENT OF INJURY BY SAFETY EQUIPMENT USE

2.2(a) DISTRIBUTION OF EXTENT OF INJURIES FOR EACH SAFETY EQUIPMENT USE

	Fatal	Major	Minor	Minimal	None	Unknown	Total	Total(%)
Pelvic and Torso Belt	4	67	76	54	187	0	388	46.6
Pelvic Belt	0	8	11	10	38	1	68	8.2
None Used	11	50	37	18	31	0	147	17.6
Not Known	4	38	18	8	18	7	93	11.2
None Fitted	9	24	13	2	7	0	55	6.6
Helmet	8	37	22	5	2	1	75	9.0
No Helmet	2	1	1	0	1	0	5	0.6
Child Restraint	0	0	0	0	2	0	2	0.2
Total	38	225	178	97	286	9	833	100.0
Total(%)	4.6	27.0	21.4	11.6	34.3	1.1	100.0	-

When comparing known seatbelt users to non-users, 456 of 603 (75.6%) drivers and passengers were wearing the pelvic and torso belt or at least the pelvic belt.

2.2(b) PERCENTAGE DISTRIBUTION OF EXTENT OF INJURIES FOR EACH SAFETY EQUIPMENT USE

	Fatal	Major	Minor	Minimal	None	Total(%)
Pelvic and Torso Belt	1.03	17.27	19.59	13.92	48.20	100.00
Pelvic Belt	0.00	11.94	16.42	14.93	56.72	100.00
None Used	7.48	34.01	25.17	12.24	21.09	100.00
Not Known	4.65	44.19	20.93	9.30	20.93	100.00
None Fitted*	16.36	43.64	23.64	3.64	12.73	100.00
Helmet	10.81	50.00	29.73	6.76	2.70	100.00
No Helmet	insufficient data					
Child Restraint	insufficient data					

*Category primarily consists of bicyclists

A comparison of injury data for each safety equipment use confirms the safety value of seatbelts.

2.3 EXTENT OF INJURY OF EJECTED PERSONS

Extent of Injury	# Ejected From Pass. Veh.	%	Study % *
Fatal	7	16.7	3.0
Major	16	38.1	23.8
Minor	16	38.1	20.9
Minimal	3	7.1	13.0
None	0	0.0	39.3
Total	42	100.0	100.0

*The Study percentage was calculated by dividing the number of drivers and passengers in each injury class by the total number of Study drivers and passengers. Motorcyclists and bicyclists are excluded from the calculation because they are not considered in the 'Number Ejected from Passenger Vehicles'.

It is clear from the above table that persons ejected from their vehicles suffer much more serious injury on an average than do persons not ejected. Note the extreme over-representation of fatal, major and minor injuries. In fact, there was no person ejected that did not suffer a personal injury.

2.4 AGE AND SEX OF DRIVERS

Age Group	Licenced (%) (a)			All Drivers In Study Accidents (%)			At-Fault Drivers (%) (b)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
-15	-	-	-	3.89	1.17	5.06	6.42	1.01	7.43
16-19	4.41	2.84	7.25	18.09	3.11	21.20	22.97	3.04	26.01
20-24	7.40	5.71	13.10	16.93	3.31	20.24	19.59	2.36	21.96
25-34	14.30	11.71	26.01	15.95	4.67	20.62	14.86	3.04	17.91
35-44	10.68	8.10	18.78	7.59	4.48	12.07	6.08	2.03	8.11
45-54	9.32	6.22	15.54	6.42	2.72	9.14	5.07	2.03	7.09
55-64	7.00	4.51	11.50	5.06	0.97	6.03	3.04	1.01	4.05
65+	5.23	2.56	7.79	3.31	0.58	3.89	3.38	1.01	4.39
Not Known	-	-	-	-	-	1.75	-	-	3.04
Total	58.34	41.65	100.00	77.24	21.01	100.00	81.42	15.54	100.00(c)

(a) Licenced drivers in Ontario, 1979.

(b) Drivers judged to be 'at-fault' in the accident. (Sample size is 296). In the case of two vehicle accidents the driver more at-fault is classified as 'at-fault'. It should not be interpreted that the not 'at-fault' driver is necessarily blameless.

(c) Figures may not sum properly because of rounding.

Males 16-19 years are vastly over-represented in 'all drivers in Study accidents' and 'at-fault drivers'. Males 20-24 are significantly over-represented, but to a lesser degree than 16-19 year olds. Males 25-34 are about evenly represented and all drivers over 35 years are involved in fewer accidents than their numbers would suggest.

Except for 16-19 year olds, females are under-represented in 'all drivers in Study accidents' and 'at-fault drivers'. The 16-19 year old females are about evenly represented.

2.5 DRIVERS AND ACCIDENTS INVOLVING IMPROPERLY LICENCED DRIVERS

2.5(a) LICENCE STATUS

Licenced	400	(87.9%)
Not Licenced*	55	(12.1%)
Sub Total	455	
Unknown	6	
Licence Not Required **	45	
Total	514	

* Includes suspended, cancelled and improper class of licences as well as persons who have never possessed a licence.

** Drivers of bicycles, tricycles and trains.

2.5(b) REGIONAL LOCATION

Region	No. Unlicenced Drivers	%
Niagara	23	41.8
Hamilton-Wentworth	19	34.6
Halton	13	23.6
Total	55	100.0

2.5(c) AGE OF IMPROPERLY LICENCED DRIVERS

Age	Male	Female	Total	%
-15	5	0	5	9.1
16-19	18	4	22	40.0
20-24	12	2	14	25.4
25-34	6	0	6	10.9
35-44	4	0	6	10.0
45-54	1	0	1	1.8
55-64	0	1	1	1.8
65+	1	0	1	1.8
Total	47	8	55	100.0

- 85.5% of unlicenced drivers are male (males make up 77.2% of involved persons in the Study).

- 40% of unlicenced drivers 16-19 years. This group makes up only 7.25% of licenced drivers and 21.20% of involved persons in Study accidents.

2.5(d) VEHICLE DRIVEN BY IMPROPERLY LICENCED DRIVERS

24 of 55 (43.6%) of non-licenced drivers were driving motorcycles. Motorcycle involvement in the Study was 12.1% (See Section 6.1).

This heavy over-representation of motorcyclists among non-licenced drivers can be attributed to the many motorcyclists driving with the improper class of licence e.g. holding an auto licence but not a motorcycle licence.

2.5(e) ALCOHOL CONTRIBUTION TO CAUSES OF ACCIDENTS FOR IMPROPERLY LICENCED DRIVERS

Yes	21	(39.6%)
No	32	(60.4%)
Unknown	2	
Total	55	

Considering the Study average of 16.9% (see Section 2.10 (a)) unlicenced drivers are over-represented in alcohol-related accidents.

2.5(f) SELECTED DRIVER ACTIONS OF IMPROPERLY LICENCED DRIVERS

Driver Action	Unlicenced Driver %	Study %
Properly	9.1	40.9
Lost Control	46.0	38.5
Disobey Traffic Signal or Stop Sign	18.0	14.5

- Unlicenced drivers cause proportionally more accidents than licenced drivers.
- They tend to lose control of their vehicles more than the average driver.

2.5(g) CHARGES LAID AGAINST IMPROPERLY LICENCED DRIVERS

- Only 31% (17 of 55) of non-licenced drivers were charged under 13 (1) or 14 (1) of the Highway Traffic Act (no or improper class of licence or fail to produce licence).
- 18% (10 of 55) non-licenced drivers were charged under the Criminal Code of Canada. This compares to an average of 6.5% (26 of 400) for licenced drivers.

2.6. VEHICLE MANOEUVRE

Going Ahead	398
Slowing or Stopping	13
Overtaking	12
Turning Left	54
Turning Right	5
Making 'U' Turn	3
Changing Lanes	2
Merging	0
Reversing	4
Stopped or Parked	14
Pull Away From Shoulder/Curb	2
Pull Onto Shoulder/Curb	0
Unknown	6
Pulling Out of Ditch	1
Total	514

2.7 DRIVER ACTION AND DRIVER CONDITION

	Normal	Had Been Drinking	Impaired Alcohol	Impaired Drugs	Fatigue	Medical Defect	Unknown	Other	Total
Properly	190	8	0	0	0	2	10	0	210
Following Too Close	3	0	1	0	0	0	1	0	5
Speeding	9	6	3	0	0	0	4	0	22
Improper Turn	10	1	1	0	0	0	1	0	13
Disobey Traffic Signal	12	4	2	0	0	0	2	0	20
Disobey Stop Sign	17	3	0	0	0	0	4	0	24
Fail to Yield Right-of-Way	38	6	3	0	1	1	5	0	54
Improper Passing	2	5	0	0	0	0	0	0	7
Lost Control	49	38	8	1	4	2	14	1	117
Wrong Way on One-Way	3	1	0	0	0	0	0	0	4
Not Known	3	7	3	0	1	0	11	3	28
Other	5	2	0	0	0	0	3	0	10
Total	341	81	21	1	6	5	55	4	514

A relatively high percentage of persons in 'lost control' accidents were drinking. Note that 'Had Been Drinking' does not necessarily mean that the alcohol consumer contributed to the cause of the accident.

2.8. LOST CONTROL

The following are the various reasons drivers lost control of their vehicles in Study accidents. They are based on the police investigation of the accident and the judgement of the investigating police officer. There were 116 such 'Lost Control' accidents. In some accidents more than one reason was given for lost control, consequently the frequency of the factors sum to a number in excess of 116. For example, 'Speed Too Fast For Conditions' and 'Alcohol' combined to cause the driver to lose control of the vehicle. In all likelihood there would be three factors contributing to lost control in this scenario - the speed, the condition under which the driver was speeding and the alcohol.

Reasons For Lost Control

Speed Too Fast For Conditions	53
Alcohol	46
Lost Concentration	15
Inexperience	14
Improper Correction From Shoulder	9
Took Action To Avoid Other Vehicle	7
Fell Asleep	5
Vehicle Defect	5
Wet Road	5
Took Action To Avoid Animal	4
Took Action To Avoid Object	3
Medical Defect	2
Railroad Tracks	2
Passenger Grabbed Steering Wheel	2

In 53 of the 'Lost Control' accidents in the Study, 'Speed Too Fast For Conditions' was mentioned as contributory to the cause or severity of the accident. The following is a breakdown of those conditions; and again more than one condition was frequently specified.

Speed Too Fast For...	Curve in the Road	19
	Alcohol in Driver's Blood	16
	Gravel Road	8
	Inattention of Driver	5
	Wet Road Condition	4
	Turning Movement	4
	Passing Movement	3

2.9 VISIBILITY

The following is a list of visibility problems encountered by drivers in Study accidents. What is probably the worst visibility problem -- darkness, is not listed; however several factors related to night visibility are mentioned (glare from oncoming headlights, dark clothing, no headlight on motorcycle etc.). The reason darkness itself is excluded from the list is that in many accidents it is simply too difficult to establish whether or not darkness contributed to the cause of the accident.

Visibility Impaired or Blocked

Rain	10
Other Vehicles* - in Traffic	8
Vehicle Not Well Illuminated or Reflectorized	8
Truck, Van, Bus	7
Curve, Hill	6
Glare From the Sun	5
Other Vehicles* - Parked	4
Dark Clothing	4
Tree Branches	3
Blind Spot on Passenger Side	3
Glare From Oncoming Headlights	2
Fog	2
Dark Colour of Vehicle at Night	1
Hail	1
Basket Blew in Face of Motorcyclist	1

*'Other Vehicles' refers to vehicles other than truck, van or bus.

2.10 CHARACTERISTICS OF ACCIDENTS IN WHICH ALCOHOL WAS JUDGED CONTRIBUTORY TO THE CAUSE BY THE INVESTIGATING POLICE OFFICER

2.10 (a). ALCOHOL AND DRUGS

Yes - Drivers	- 90
Passengers	- 1
Pedestrian	- 7
No	-215
Unknown	- 17
Total	330

- Alcohol or Drugs was judged by the investigating officer to have contributed to the cause of 98 of 313 (31.3%) Study accidents.
- Drugs were mentioned in 6 cases, but contribution to the cause of the accident was determined in only 3.
- Alcohol then, according to police opinion, contributed in some way to the cause of 95 (30.4%) Study accidents.
- 87 of the 514 Study drivers (16.9%) consumed enough alcohol so that it contributed to the cause of the accident.
- 87 of 478 drivers of motor vehicles only (excludes bicyclists) (18.2%) in the Study consumed enough alcohol so that it contributed to the cause of the accident.

2.10 (b). ALCOHOL INVOLVEMENT IN FATAL ACCIDENTS ONLY (ALL CLASSES OF VICTIMS)

Yes	- 13 (40.6%)
No	- 19 (59.4%)
Unknown	- 7
Total	- 39

10(c). AGE BY CLASS OF VICTIM FOR ACCIDENTS INVOLVING ALCOHOL

	Drivers	Motorcyclist	Bicyclist	Passenger	Pedestrian	Other	Total
-15	0	0	0	0	0	0	0
-19	21	3	0	1	4	0	29
-24	22	8	0	0	1	0	31
-34	14	5	0	0	1	0	20
-44	3	0	0	0	1	0	4
-54	5	0	0	0	0	0	5
-64	2	0	0	0	0	0	2
+	2	0	0	0	0	0	2
known	2	0	0	0	0	0	2
tal	71	16	0	1	7	0	95

the 16-34 age group represent 84.2% of the total alcohol involvement. Compare this to their accident involvement of the total 62.1% and their proportion of licenced drivers 46.4% and it becomes clear that alcohol presents a large problem in the 16-34 age group.

there were no cases of alcohol contributing to the cause of an accident involving a bicycle.

alcohol in motorcyclists was exclusively confined to the 16-34 age group in this small sampling.

alcohol in 16-19 year old pedestrians contributed to the cause of 4 of 7 alcohol-related pedestrian accidents.

10(d). THE 16-24 AGE GROUP OF ALCOHOL INVOLVED PERSONS

- 1
- 4
- 11 (under age)
- 13
- 9
- 8
- 6
- 5
- 3

tal 60

- about 1 in 6 (16 of 95) of serious accidents in which alcohol contributed to the cause involved an 'under age' drinker. Also note that there were only 2 charges of 'Minor Consume'. (See Section 2.11)

2.10(e) SELECTED DRIVER ACTIONS OF ALCOHOL-INVOLVED DRIVERS

	% Alcohol Users	Study %*
Lost Control	41.1	38.5
Speed Too Fast **	18.9	7.2
Fail to Yield Right of Way	8.9	17.8
Disobey Traffic Signal or Stop Sign	10.0	14.5

* Figure based on $\frac{\text{Number driver actions}}{\text{Total number driver errors}}$

Total No. drivers (514) - #driving properly (210) = total # driver errors (304)

** There are several reasons for 'lost control', and speed was frequently mentioned as one. However, the action was still interpreted as 'lost control'. Consequently, 'speed too fast for conditions' was no doubt a more contributing factor than is illustrated.

'Speed too fast' is one driver action that is heavily over-represented in alcohol-related accidents. (See note (2) above)

2.10(f) CHARGES LAID AGAINST ALCOHOL-INVOLVED DRIVERS

Out of 95 accidents in which alcohol contributed to the cause, only 17 (17.9%) drivers were charged with Impaired Driving, Over 80 Milligrams or Refuse Breathalyzer Test.

There were 29 more of these drivers whose most severe charge was Careless Driving.

There were 13 more drivers charged under another section of the Criminal Code.

No charges at all were laid against pedestrians.

2.10(g) RECORDS OF ALCOHOL-INVOLVED DRIVERS

12 of 71 (16.9%) of drivers in alcohol-related accidents had a prior conviction (last 5 years) for 'Impaired Driving', 'Over 80 Milligrams' or 'Refuse Breathalyzer Test'. In comparison, of the remaining 345 drivers for which records are known, only 10 (2.9%) had any alcohol-related prior convictions.

2.11 CHARGES LAID AGAINST STUDY DRIVERS

Charges were laid against Study drivers under the following Acts:

H.T.A. - Highway Traffic Act
C.C.C. - Criminal Code of Canada
C.A.I.A. - Compulsory Automobile Insurance Act, 1979
L.L.A. - Liquor Licence Act, 1975

H.T.A. #	Charge	No.
83	Careless Driving	90
88 (b)	Fail to Yield R.O.W. (intersection)	14
63 (3)	Driver, No Seatbelt	15
13 (1)	No Licence	15
88 (a)	Disobey Stop Sign	14
96 (5)	Disobey Red Light	13
98 (1)	Fail to Leave Half Road Free	8
94 (1)	Fail to Signal Turn	6
93 (2)	Improper Left Turn	6
63 (4)	Passenger No Seatbelt	4
96 (6)	Disobey Amber Light	3
105 (1)	Follow Too Close	4
14 (1)	Fail to Produce Licence	4
102	Wrong Way One-Way	3
91	Fail to Yield R.O.W. (driveway)	3
13 (2)	Breach Licence Condition	2
93 (1)	Improper Right Turn	1
93 (5)	Improper Turn To One-Way Road	1
123	Pedestrian Fail to Walk on Left	1
140 (1)a	Fail to Remain	1
13 (3)	Owner Allow Non-Licenced Person to Drive	1
96 (10)	Fail to Yield R.O.W. (pedestrian)	1
139 (1)	Fail to Report Accident	1
6 (1)	No Permit	1
99 (a)	Drive Left of Centre with No View	1
8 (1)a	Plate not Attached properly	1
92 (1)b	Fail to Yield R.O.W. (pedestrian)	1
104 (a)	Wrong Side of Highway	1
37 (14)	No Headlamps on Bicycle	1
57	Unsafe vehicle	1

C.C.C. #	Charge	No.
234	Impaired	14
236	Over 80 mg.	11
233 (4)	Dangerous Driving	11
233 (2)	Fail to Remain	5
203	Criminal Negligence (Death)	4
233 (1)	Criminal Negligence	2
295	Steal Vehicle	1

C.A.I.A. #	Charge	No.
2 (3)	No Insurance	2
3 (2)	Fail to Produce Insurance	2
2 (1)a	No Insurance	2

L.L.A. #	Charge	No.
45 (3)	Minor Consume	2
48 (1)	Liquor Readily Available	2

There were 8 dual charges of 'Impaired' and 'Over 80 mg'. In other words, charges of 'Impaired' and 'Over 80 mg.' were laid against 17 Study drivers.

2.12 ANALYSIS OF DRIVER RECORDS

2.12 (a). PURPOSE

The fundamental purpose of this section is to determine any correlation that may exist between:

1. driver record and driver action
2. driver record and selected driver characteristics

and thereby gain insight into the driving habits of Ontario motorists.

2.12 (b). THE RECORDS

The driver records were obtained by the Ontario Police Commission from the Ministry of Transportation and Communications (MTC) and forwarded to the Hamilton Automobile Club for analysis.

Some explanation of the convictions contained in the MTC record is required.

1. Criminal Code of Canada (CCC) convictions remain on the record for 5 years from the date of conviction.

2. Highway Traffic Act (HTA) convictions remain on the record for 3 years from the date of conviction.

3. But, only those HTA convictions for the past 2 years contribute to the current demerit point total.

2.12 (c). CLASSIFICATION SYSTEM OF DRIVER RECORDS

An ordering system had to be imposed to classify the wide assortment of 416 driver records received from MTC. It should be a system that is simple, yet effectively distinguishes between 'good' and 'bad' records. To this end, the following identification System of Driver Records was developed as a study guide. Since repeated reference is made to these classifications it is best to become familiar with them.

Class I - No current demerit point, no Criminal Code (CCC) convictions and no suspensions.

Class II - 1-6 current demerit points, no CCC convictions and no suspensions.

Class III - 7 or more current demerit points, no CCC convictions and no suspensions.

Class IV - 0-6 current demerit points, sum of CCC convictions plus suspensions is 1 or 2.

Class V - 7 or more current demerit points, sum of CCC convictions plus suspensions is 1 or 2.

Class VI - 0-6 current demerit points, sum of CCC convictions plus suspensions is 3 or more.

Class VII - 7 or more current demerit points, sum of CCC convictions plus suspensions is 3 or more.

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Class V - 7 or more current demerit points, sum of CCC convictions plus suspensions is 1 or 2.

Class VI - 0-6 current demerit points, sum of CCC convictions plus suspensions is 3 or more.

Class VII - 7 or more current demerit points, sum of CCC convictions plus suspensions is 3 or more.

2.12 (d). ILLUSTRATION OF CLASSIFICATION SYSTEM OF DRIVER RECORDS

# Current Demerit Points	#CCC + # Suspensions 0	1-2	3 or more
0	I	IV	VI
1-6	II	IV	VI
7 or more	III	V	VII

The record class number is inserted in the box with the appropriate qualifications for that record class.

2.12 (e). RATIONALE FOR CLASSIFICATION SYSTEM OF DRIVER RECORDS

There are three main elements in a driver record:

1. Criminal Code of Canada convictions
2. Suspensions
3. Highway Traffic Act convictions
   (a) contribute to the current demerit point total
   (b) never contributed to the current demerit point total
   (c) no longer contribute to the current demerit point total because the points have been regained after two years (see 2.12 (b)).

- Criminal Code of Canada Convictions

These are undoubtedly the most serious traffic-related offences and have been incorporated into the Classification System in the manner described in the section below.

- Suspensions

Suspension of a driver's right to drive is a serious action often resulting from one of the following:

1. CCC conviction
2. Demerit Point Accumulation
3. Careless Driving
4. Unpaid Fines
5. Unpaid Motor Vehicle Accident Claims Act (MVACA) claim

The unpaid fine and unpaid MVACA claim suspensions have been excluded from the primary records analysis, because they do not reflect an action that contributes directly to causes of accidents.

In the classification system, the number of CCC convictions and the number of qualifying suspension are combined and grouped in quantities of 0; 1 or 2; 3 or more. This has been done, because in many cases, the driver has a CCC conviction plus the resulting suspension, which really constitutes only one 'incident'. Con-

sequently the qualification 'sum of CCC convictions plus suspensions is 1 or 2' includes drivers who have been involved in one major 'incident'. In reality the '3 or more' category includes drivers who have been involved in 2 or more 'incidents'.

- Highway Traffic Act (HTA) Convictions

The most familiar summary measure of driving record is the demerit point total. Consequently, the current demerit point total is also included in the classification system.

For the purpose of analysis, the current demerit point total has been divided into 2 groups: The 0-6 group allows drivers two three-point offences or one careless driving conviction. While this record is by no means enviable, it should be distinguished from the record of a driver who has accumulated 7 or more demerit points. Note that in Class II the grouping is 1-6 demerit points (not 0-6), because 0 demerit points would place the record in Class I.

Convictions that do not contribute or no longer contribute to the current demerit point total have been excluded from the Classification System of Driver Records. Considering the relative severity of these convictions, it was felt that their inclusion was not worth the complication to the system that it would cause. However, the convictions that do not or no longer contribute to the current demerit point total are summarized in a frequency table (see Section 2.12 (1).) and in a correlation with current demerit point total (see Section 2.12(m).).

It must be emphasized that this Classification System of Driver Records does not attempt to consider all aspects of the driver record. It considers only:

(1) the number of CCC convictions
(2) the number of Suspensions, excluding suspensions for unpaid fine or MVACA claims.
(3) Current Demerit Point total

It is recognized that this Classification System is not perfect, but in the opinion of the Study Committee it sufficiently distinguishes between 'good' and 'bad' records in a fair and just manner.

2.12(f) RECORD CLASS OF AT-FAULT AND NO-FAULT DRIVERS

Class	At-Fault	%	No-Fault	%	Total	%
I	127	55.7	121	64.4	248*	59.6
II	53	23.2	47	25.0	100	24.0
III	18	7.9	11	5.9	29	7.0
IV	14	6.1	3	1.6	17	4.3
V	9	3.9	5	2.7	14	3.1
VI	6	2.6	1	0.5	7	1.7
VII	1	0.4	0	0.0	1	0.2
Sub-Total	228	100.0	188	100.0	416	100.0
(1) Not Known	40	-	13	-	53	-
(2) Not Required	28	-	17	-	45	-
Total	296	-	218	-	514	-

(1) The records of drivers not available from the Ministry of Transporation and Communication.

(2) Includes drivers under age 16 and drivers of vehicles for which a drivers licence is not required.

* 164 of 248 (66%) of drivers in Class I had no previous convictions.

- 5 of 6 drivers involved in the 330 accidents studied had between 0-6 demerit points only (Class I and II).

- Comparing the 'at-fault' vs. the 'no-fault' drivers, it is clear that the 'at-fault' drivers tend to have worse driving records than the 'no-fault' drivers. 'At-fault' drivers begin to be over-represented at Class III (7 or more demerit points) and continue to be over-represented throughout all classes containing prior CCC convictions.

2.12(g). RECORD CLASS OF ALCOHOL-INVOLVED DRIVERS

Class	Alcohol	%	Total	%
I	35	47.9	248	59.6
II	14	19.2	100	24.0
III	8	11.0	29	7.0
IV	8	11.0	17	4.3
V	5	6.8	14	3.1
VI	2	2.7	7	1.7
VII	1	1.4	1	0.2
Sub-Total	73	100.0	416	100.0
Unknown	22	-	98	-
Total	95	-	514	-

Despite the small sample (95) of alcohol-related accidents, the trend is clear. Drivers in Class III-VII are overrepresented in alcohol-related accidents. Of particular note is the heavy over-representation of drivers with prior CCC convictions in Class IV especially.

For a direct record reference to prior alcohol-related convictions see Section 2.10(g).

2.12(h) RECORD CLASS BY AGE OF DRIVER

	I	II	III	IV	V	VI	VII	Unknown	Not Required	Total
-15	0	0	0	0	0	0	0	0	26	26
16-19	49	19	7	2	3	0	0	20	9	109
20-24	47	14	12	7	6	3	0	10	5	104
25-34	50	31	6	4	2	3	1	8	1	106
35-44	35	17	2	2	1	1	0	3	1	62
45-54	34	8	2	1	0	0	0	1	1	47
55-64	17	8	0	1	1	0	0	2	2	31
65+	16	3	0	1	0	0	0	0	0	20
Unknown	0	0	0	0	0	0	0	9	0	9
Total	248	100	29	18	13	7	1	53	45	514

RECORD CLASS BY AGE OF DRIVER (IN %)

Note: The Unknown and Not Required columns are excluded from the following calculations.

	I	II	III	IV	V	VI	VII	Total
-15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16-19	61.25	23.75	8.75	2.50	3.75	0.0	0.0	100.00
20-24	51.65	15.38	13.19	7.69	6.59	3.30	0.0	100.00
25-34	51.55	31.96	6.19	4.12	2.06	3.09	1.03	100.00
35-44	60.34	29.31	3.49	3.49	1.72	1.72	0.0	100.00
45-54	75.56	17.78	4.44	2.22	0.0	0.0	0.0	100.00
55-64	62.96	29.63	0.0	3.70	3.70	0.0	0.0	100.00
65+	80.00	15.00	0.0	5.00	0.0	0.0	0.0	100.00
All Age Groups	59.62	24.04	6.97	4.33	3.13	1.68	0.24	100.00

- 85% of drivers 16-19 years old are in Class I or II (i.e. have no record or a record of 1-6 demerit points only). Only 5 of these drivers have a CCC conviction.
- Drivers in the 20-24 age group have the worst records. Only 67% of these drivers were in Class I or II. This is 16.5% less than the next worst age class. The 20-24 age group is vastly over-represented in Classes III-VI.
- 83.5% of drivers in the 25-34 age group are in Class I or II; however there are more in Class II (31.5%) and less in Class I (51.55%) than any other group. Yet the records for the 25-34 group are not as severe as the 20-24 group because of the relatively fewer drivers in Classes II-VI.
- Around 90% or more of drivers in the rest of the age groups were in Class I or II.

2.12(i) RECORD CLASS OF DRIVERS WHO 'LOST CONTROL'

Class	# Drivers Who 'Lost Control'	%	Study % for Each Class
I	57	60.6	59.6
II	22	23.4	24.0
III	5	5.3	7.0
IV	4	4.3	4.3
V	2	2.1	3.1
VI	4	4.3	1.7
VII	0	0.0	0.2
Sub-Total	94	100.0	100.0
(1) Not Known	13		
(2) Not Required	10		
Total	117		

(1) The records of drivers not available from M.T.C.

(2) Includes drivers under age 16 and drivers of vehicles for which a driver's licence is not required.

The distribution of records of drivers who 'lost control' is practically the same as the Study percentage.

The specific HTA charge that is most closely associated with lost control is careless driving. Of the 117 drivers who 'lost control' 4 (3.4%) had a prior conviction for careless driving.

2.12(j). RECORD OF DRIVERS WHO 'FAILED TO YIELD RIGHT OF WAY (R.O.W.)'

Clear Record	- 18 (33.3%)
Disobey Red Light	- 5 (9.3%)
Fail to Yield R.O.W. at Intersection	- 2 (3.7%)
Prohibited Turn	- 2 (3.7%)
Unsafe Move	- 2 (3.7%)
Fail to Share Half the Road	- 1 (1.9%)
Disobey Amber Light	- 1 (1.9%)
Other Convictions	- 12 (22.2%)
Unknown Record*	- 5 (9.3%)
Licence Not Required	- 6 (11.1%)
Total	- 54 (100.0%)

*The 'Unknown Record' category primarily consists of unlicenced or out of province drivers. The 'Licence Not Required' category primarily consists of bicyclists.

The only specific offences listed that might correspond to the driver action 'Fail to Yield R.O.W.' are:

(1) Fail to Yield R.O.W. at Intersection
(2) Fail to Share Half the Road

Only 3 drivers of 54 (5.6%) whose driver action was 'Fail to Yield R.O.W.' had such a prior conviction on record.

If related actions such as disobeying traffic lights, unsafe moves and prohibited turns are included, the total of drivers who had prior convictions is brought to 13 of 54 (24.1%).

2.12(k) RECORD OF DRIVERS WHO 'DISOBEYED TRAFFIC SIGNAL LIGHT OR STOP SIGN'

Clear Record	14 (31.8%)
Disobey Traffic Signal or Stop Sign	7 (15.9%)
Fail to Yield R.O.W. at Intersection	4 (9.1%)
Other Convictions	8 (18.2%)
Unknown Record (Unlicenced Drivers)	6 (13.6%)
Licence Not Required (Bicyclist)	5 (11.4%)
Total	44 (100.0%)

- 15.9% of drivers who 'disobeyed a traffic signal light or stop sign' had a prior conviction for such an action. For drivers whose record is known, the percentage jumps to 21.2%. In comparison, other drivers in the Study who did not 'disobey a traffic signal light or stop sign' - 29 of 383 (7.5%) of known records indicated a prior conviction for disobeying a traffic signal or stop sign.

- 31.8% of drivers with a clear record (no convictions at all), is consistent with the Study average and 13.6% unlicenced is just slightly above the 12.1% Study average.

- The number of bicyclists disobeying a traffic signal light or stop sign (11.4%) is well above overall bicycle involvement (6.6%). Therefore bicyclists are over-represented in this driver action.

2.12(1) H.T.A. OFFENCES THAT DO NOT OR NO LONGER CONTRIBUTE TO THE CURRENT DEMERIT POINT TOTAL BY RECORD CLASS OF DRIVER

	I	II	III	IV	V	VI	VII	TOTAL
Speeding (1,2)	50	53	30	8	18	2	2	163
No Seatbelts	15	6	5	1	6	0	1	34
Unnecessary Noise	4	5	4	4	5	1	1	24
Fail to Produce Insurance	8	6	1	0	5	0	1	21
Fail to Produce Licence	3	6	7	0	2	0	0	18
Licence Cancellation	2	2	0	1	5	1	1	12
No or Improper Class of Licence	2	6	0	3	0	0	0	11
Disobey Red Light (2)	7	1	1	0	1	0	0	10
Fail to Notify Change of Address	3	0	1	1	1	0	0	6
Improper Lane Change on Divided Highway	0	2	1	0	2	0	0	5
Not Come to Full Stop at Intersection (2)	4	0	0	0	1	0	0	5
No or Improper Driving Lamps	3	0	2	0	0	0	0	5
Suspensions (3)	5	14	7	2	2	0	1	31
Other	17	16	11	2	12	2	0	60
Total	123	117	70	22	60	6	7	405
# in Class	248	100	29	18	13	7	1	416
Convictions/ # in Class	0.50	1.17	2.41	1.22	4.62	0.86	7.00	0.97

(1) Speeding at less than 16 km/hr. over the limit.

(2) Convictions that are still on record but for which the demerit points no longer count toward the current total because of time limit for recovery of demerit points.

(3) Suspensions for unpaid fines and unpaid MVACA claims only.

- The heavy over-representation of Class III and V drivers suggests that drivers with high current demerit point totals tend to commit offences not within the demerit point system more frequently than do drivers with low demerit point totals.

- If drivers in Classes III-VII (comprise 16.4% total drivers) have 50% or more of the convictions for a certain offence, then it follows that such an offence is common to drivers with poor records.

Such offences are:	Licence Cancellation	66.7%
	Unnecessary Noise	62.5%
	Fail to Produce Licence	50.0%
	Fail to Notify of Change of Address	50.0%

2.12(m) CURRENT DEMERIT POINTS AND OTHER H.T.A. OFFENCES

This is a comparison of the current demerit point total and the number of other H.T.A. offences that do not contribute to the current demerit point total. For example, a driver might have 3 current demerit points for disobeying a red light and also have one other H.T.A. conviction for failing to produce insurance. This examination excludes all CCC convictions.

Current Demerit Points	# In Class	% Other H.T.A. Offences For Each Demerit Point Class			
		0	1-2	3 or More	Total
0	256	67.6	24.6	7.8	100.0
1-6	117	48.7	36.8	14.5	100.0
7 or more	43	16.3	32.6	51.2	100.0

Generally speaking, the higher the current demerit point total the more H.T.A. offences will be committee that do not contribute to the current demerit point total. 67.6% of drivers with no current demerit points had no other H.T.A. convictions while only 16.3% of drivers with 7 or more current demerit points had no other H.T.A. convictions on record. At the other extreme, drivers with no current demerit points had 3 or more other H.T.A. offences only 7.8% of the time compared to 51.2% for drivers with 7 or more current demerit points.

SECTION 3 - CHARACTERISTICS OF MOTORCYCLISTS AND MOTORCYCLE ACCIDENTS

There were 61 motorcycle accidents in the Study involving 62 drivers and 18 motorcycle passengers. Motorcycles were involved in 18.5% of the 330 total Study accidents and motorcyclists represented 12.1% of 514 Study drivers. Motorcycles were highly over-represented in fatal accidents, representing 21.7% of total Study fatalities compared to their percentage (1.9%) of the Ontario vehicle population.

3.1. OCCURRENCE BY REGION

Region	Number	Fatalities
Niagara	27	2
Hamilton-Wentworth	20	6
Halton	14	2
Total	61	10

3.2. OCCURRENCE BY MONTH

Month	Number	Fatalities
May	18	3
June	15	3
July	14	1
August	14	3

3.3. OCCURRENCE BY DAY OF WEEK

Day of Week	Number
Monday	4
Tuesday	8
Wednesday	3
Thursday	8
Friday	15
Saturday	13
Sunday	10

The weekends, including Friday were the most critical.

3.4 OCCURRENCE BY HOUR OF DAY

00:00-02:59 - 19	12:00-14:59 - 9
03:00-05:59 - 1	15:00-17:59 - 13
06:00-08:59 - 1	18:00-20:59 - 5
09:00-11:59 - 3	21:00-23:59 - 10

- 29 of 61 (47.5%) motorcycle accidents occurred in hours of darkness. The Study nightime accident rate was 40%.

3.5 AGE OF MOTORCYCLE DRIVERS

Age	Number	%	% All Study Drivers
-15	4	6.5	5.06
16-19	19	30.6	21.20
20-24	22	35.5	20.24
25-34	11	17.7	20.62
35-44	3	4.8	12.07
45-54	2	3.2	9.14
55-64	0	0.0	6.03
65+	0	0.0	3.89
Unknown	1	1.6	1.75
Total	62	100.0	100.00

The 20-24 age group is the most critically over-represented age group as a % of all Study drivers.

3.6 ALCOHOL INVOLVEMENT IN MOTORCYCLE ACCIDENTS

Alcohol consumption in motorcyclists was significant; enough that in the opinion of the investigating police officer, it contributed to the cause of the accident in 16 of 62 (25.8%) instances. This compares to 71 of 416 (17.1%) for drivers of other motor vehicles.

3.7 DRIVING RECORD OF MOTORCYCLISTS

Class*	# Motorcyclists	%	Other Motor Vehicle Drivers	%
I	21	45.7	227	61.4
II	10	21.7	90	24.3
III	6	13.0	23	6.2
IV	2	4.3	15	4.1
V	2	4.3	12	3.2
VI	4	8.7	3	0.8
VII	1	2.2	0	0.0
Sub-Total	46	100.0	370	100.0
Not Known	16**	-	37	-
Not Required	-	-	45	-
Total	62	-	452	-

* See Section 2.11, 'Driver Record' for an explanation of the Record Classes.

** The high 'Not Known' figure accounts for the relatively large number of unlicenced or improperly licenced motorcyclists.

3.8. FAULT IN MOTORCYCLE ACCIDENTS

Single Motor Vehicle Accident	- 29
Motorcyclist	- 18
Other Driver	- 13
Pedestrian	- 1

3.9. MOTORCYCLIST ACTION (Two Or More Vehicle Accidents Only)

Crossed Centre Line at Curve	- 4
Disobey Stop Sign	- 2
Unsafe Lane Change (While Passing)	- 2
Improper Passing	- 2
Speed Too Fast and Inattention at Railway Crossing	- 2
Accelerate Too Fast	- 2
Took Action to Avoid Animal	- 2
Fail to Yield to Traffic While on Shoulder	- 1
Drove into Rear of Stopped Vehicle	- 1
Struck Pedestrian (Hit & Run)	- 1

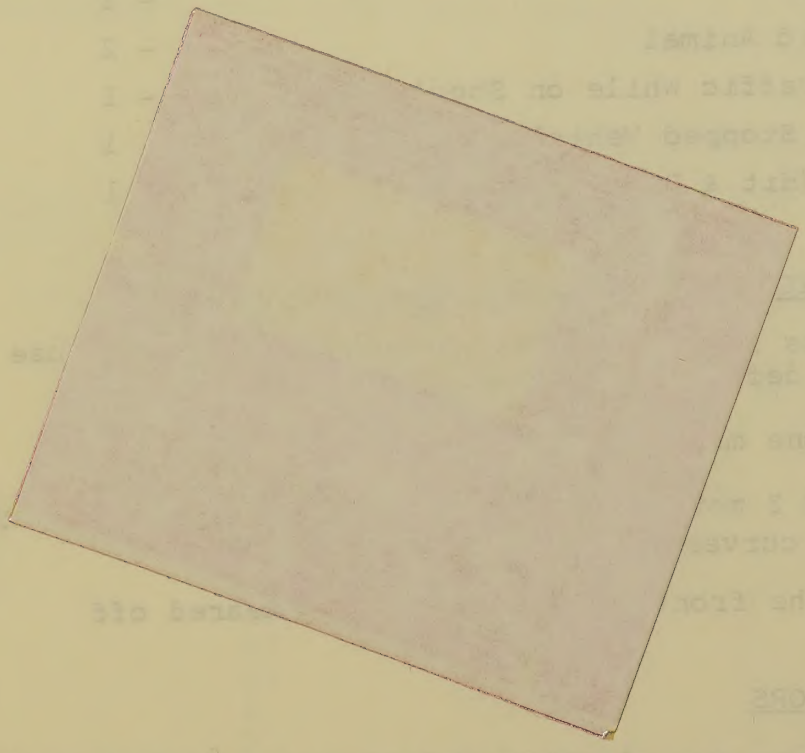
3.10. VEHICLE DEFECT - MOTORCYCLES (See Section 6.7)

Vehicle Defects in motorcycles contributed to the cause of more accidents (4) than defects in any other vehicle type.

- the headlamp on one motorcycle was not working
- the kick stand of 2 motorcycles fell down while the motorcyclist were negotiating curves
- the pin holding the front end to the frame sheared off

3.11. ROADWAY FACTORS

- Motorcycle accidents are slightly under-represented at intersections with respect to other Study vehicles. Although the sample is small, motorcycle accidents were over-represented at railway crossings. (See Section 7.5)
- Motorcycle accidents are over-involved at level curves and curves on hills. (See Section 7.8)



3.12. URBAN/RURAL LOCATION OF MOTORCYCLE ACCIDENTS

Determination of the urban/rural characteristics was based on knowledge of the specific location, the speed limit indicated on the accident report, maps of the area and the context of the accident report. Consequently, some judgments were made and the figures should not be interpreted as exact.

Urban - 45
Rural - 16

It should be noted that all 20 motorcycle accidents in Hamilton-Wentworth occurred in an urban environment.

3.13. OTHER MOTORCYCLE DATA CONTAINED IN OTHER SECTIONS OF THE REPORT

24 of all 55 (43.6%) improperly licenced drivers were driving motorcycles. Motorcycle involvement in the Study 12.1% of total vehicle population. (See Section 2.5(d).).

75 of 80 (94%) motorcyclists were wearing helmets. (See Section 2.2(a)).

Motorcycles are over-represented by 2 times in single vehicle accidents. (See Section 6.2).

SECTION 4 - CHARACTERISTICS OF BICYCLISTS AND BICYCLE ACCIDENTS

Although there were 34 bicyclists involved in 30 (9.1%) Study accidents, bicycle fatalities represented 7 (15%) of the 46 total fatalities.

4.1. OCCURRENCE BY REGION

Region	Number	Fatalities
Niagara	14	3
Hamilton-Wentworth	9	1
Halton	7	3
Total	30	7

4.2 OCCURRENCE BY MONTH

Month	Number	Fatalities
May	6*	1
June	12	2
July	10	4
August	2	0
Total	30	7

* All 6 May accidents occurred in the last week of the month.

4.3 OCCURRENCE BY DAY OF WEEK

Day of Week	Number
Monday	3
Tuesday	2
Wednesday	6
Thursday	3
Friday	3
Saturday	8
Sunday	5

4.4 OCCURRENCE BY HOUR OF DAY

0:00-2:59 - 2	12:00-14:59 - 3
3:00-5:59 - 0	15:00-17:59 - 5
6:00-8:59 - 2	18:00-20:59 - 10
9:00-11:59 - 2	21:00-23:59 - 6

7 of 30 (23.3%) bicycle accidents occurred during hours of darkness. There were 3 fatalities all in one accident at night. In 5 of the 7 nighttime bicycle accidents inadequate bicycle illumination or reflectorization was judged to be partly contributory to the cause of the accident.

4.5 Age of Bicyclists

Age Class	Number	Fatalities
0- 4	0	0
5- 9	7	1
10-14	10	2
15-19	10	1
20-24	6	0
25-54	0	0
55-64	1	1
65+	0	0

4.6 FAULT IN BICYCLE ACCIDENTS

Bicyclist -	- 16
Motor Vehicle Driver	- 5
Visibility	- 8
Not Determinable	- 1

Darkness impaired visibility in 5 of the 8 'fault of poor visibility' accidents. Parked vehicles were contributory to the cause of the other 3 accidents. If judgement were to be rendered on driver fault in these 8 accidents, the bicyclist would be more at-fault in 5 of them and the driver in 3.

4.7 BICYCLIST ACTION

This is a summary of actions of bicyclists in the 16 accidents in which they were judged at-fault.

Sudden Movement Or Turn	- 6
Disobey Stop Sign	- 4
Drive Into Roadway From Curb Or Driveway	- 2
Disobey Traffic Signal	- 1
Lost Control	- 1
Speed Too Fast On Curve	- 1
Took Action To Avoid Motor Vehicle	- 1

Two of the sudden movements or turns were precipitated by bicyclists carrying an object (a popsicle and a case of beer) in one hand and losing control of the bicycle.

4.8 VEHICLE DEFECT - BICYCLES

The mechanical condition of the bicycle contributed to the cause in one accident only. The hand brakes did not work in wet conditions.

4.9 ROADWAY FACTORS

The roadway was judged as contributory to the cause of 2 bicycle accidents.

In both cases severe alignment contributed, and in the one case a faded centre line, inadequate signing and high speed limit were also judged contributory.

4.10 OTHER BICYCLE ACCIDENT FACTS

- In no bicycle accident was alcohol a contributing factor on the part of either the bicyclist or motor vehicle driver.
- No bicyclists were charged.
- Of 11 Study hit-and-run accidents, 3 (27.3%) involved a motor vehicle striking a bicycle and 2 of these 3 occurred in hours of darkness.
- 6 of 7 nightime accidents occurred on what could be classified as arterial roads.

  Plains Rd., Burlington (2)
  Main St., Grimsby
  Welland Ave., St. Catharines
  Wilson St., Ancaster
  Rebecca St., Oakville

- The significant point is that the nightime bicycle accidents did not occur on streets in residential areas. Inadequate lighting on bicycle and/or of the roadway would be a logical deduction.

SECTION 5 - CHARACTERISTICS OF PEDESTRIANS AND PEDESTRIAN ACCIDENTS

There were 52 accidents (15.8% of all Study accidents) involving 57 pedestrians.

5.1 OCCURRENCE BY REGION

Region	Number	Fatalities
Hamilton-Wentworth	23	3
Niagara	22	4
Halton	7	1
Total	52	8

5.2 OCCURRENCE BY MONTH

Month	Number	Fatalities
May	18	5
June	12	0
July	15	2
August	7	1
Total	52	8

5.3 OCCURRENCE BY DAY OF WEEK

Day of Week	Number
Monday	5
Tuesday	5
Wednesday	6
Thursday	7
Friday	11
Saturday	8
Sunday	10

5.4 OCCURRENCE BY HOUR OF DAY

00:00-02:59 - 9	12:00-14:59 - 9
03:00-05:59 - 0	12:00-17:59 - 16
06:00-08:59 - 3	18:00-20:59 - 3
09:00-11:59 - 1	21:00-23:59 - 11

Note the extremely high proportion occurring between 9 p.m. and 3 a.m.

5.5. AGE OF PEDESTRIANS

Age of Pedestrians	Number	Fatalities	%
0- 4	7	1	12.3
5- 9	7		12.3
10-14	3	1	5.7
15-19	14	2	24.6
20-24	7	1	12.3
25-34	6		10.5
35-44	4		7.0
45-54	2	1	3.5
55-64	1		1.8
65+	5	1	8.8
Unknown	1		1.8
Total	57	8	100.0

This distribution by ages appears to be a change compared to standard distributions of past years. Pedestrians under the age of 15 or over the age of 65 represent 38.6% of involved pedestrians and 37.5% of pedestrian fatalities in the Study. According to the MTC 'Motor Vehicle Accident Facts' booklets from 1977, 1978, 1979, pedestrian involvement in fatal and injury accidents for these age groups was around 50% for each of these three years.

5.6. DRIVER VISIBILITY IMPAIRED OR BLOCKED IN PEDESTRIAN ACCIDENTS

Stopped or Parked Car	7
Darkness *	7
Dark Clothing	3
Vehicles in Traffic	2
Glare of Oncoming Headlights	2
Rain	2
Blind Spot on Passenger Side	2

* 20 of 52 (38.5%) of pedestrian accidents occurred in hours of darkness, but in only 7 of them was the darkness judged contributory to the cause of the accident.

5.7. FAULT IN PEDESTRIAN ACCIDENTS

Motor Vehicle Driver	- 12 (23.1%)
Pedestrian	- 39 (75.0%)
Both	- 1 (1.9%)
Total	- 52 (100.0%)

5.8. AT-FAULT PEDESTRIAN ACTION AND AGE OF PEDESTRIAN

Action	Number	Fatalities	Age
Running into Roadway	8	1	1½,3,3,4,4,5, 6,7
Running into Roadway from Between or In Front of Parked Vehicles	7	1	3,4,5,5,6,10, 13
Crossing Street - Inattention	5	1	22,40,64,75,77
Crossing Intersection Without Right-of-Way	4		9,19,33,51
Riding on Exterior of Vehicle	4	1	16,(16,17), (16,16),28
Stepped Off Curb Into Traffic	2	1	23,43
Crossing Road in Traffic	2		18,27
Trying to Push Vehicle Out of Ditch	2		17,18
Standing in Roadway - Inattention	2		18, 27
Jumped in Front of Car	1		39
Walking on Road With Traffic	1	1	(18,18)
Was Propelled into Vehicle	1		21
Standing Too Close to Moving Vehicle	1		24

Note: Bracketed ages - eg. (16,17) means pedestrians of those ages were involved in the same accident.

5.9. PEDESTRIAN CONDITION (as indicated on the Standard Motor Vehicle Accident Report Form)

Condition	Number	%
Normal	36	63.2
HBD	6	10.5
Impaired	2	3.5
Other	2	3.5
Unknown	11	19.3
Total	57	100.0

In the judgement of the investigating police officer, alcohol contributed to the cause of 7 pedestrian accidents.

5.10. VEHICLE FACTORS IN PEDESTRIAN ACCIDENTS

The vehicles involved contributed to the cause of 3 accidents. There was a visibility impairment in 2 vans and a mechanical defect in a passenger car.

5.11. ROADWAY FACTORS IN PEDESTRIAN ACCIDENTS

Roadway factors did not appear to contribute to the cause of any pedestrian accidents.

5.12. OTHER PEDESTRIAN ACCIDENT FACTS

There were 4 hit and run pedestrian accidents, with 3 of them occurring in hours of darkness.

There were 3 instances of vehicles turning left and the driver not seeing the pedestrian in the crosswalk.

One pedestrian was charged under Section 123 of the Highway Traffic Act for Failing to Walk on the Left.

SECTION 6 - TYPES OF VEHICLES INVOLVED AND RELATIONSHIPS

6.1 TYPES OF VEHICLES INVOLVED IN STUDY ACCIDENTS

Type	No.	Study %	Study % (1)	Ontario % (2)
Passenger Car	332	64.6	69.9	77.7
Motorcycle	62	12.1	13.1	1.9
Pick-up Truck	36	7.0	7.6	8.8
Bicycle	34	6.6	-	-
Van	22	4.3	4.6	4.1
Tractor-Trailer	7	1.4	1.5	0.9
Other Truck	5	1.0	1.1	-
Bus	4	0.8	0.8	-
Train	3	0.6	-	-
Jeep	3	0.6	0.6	-
Tricycle	2	0.4	-	-
Other Vehicle	2	0.4	0.4	-
Unknown	2	o.4	0.4	
Total	514	100.0	100.0	

(1) registered vehicles only - these figures can be compared to the "Ontario %" figures.

(2) represents Ontario Vehicle Mix in 1978, based on vehicle registration

The most remarkable finding illustrated in the above table is the heavy over-representation of motorcycles in fatal and hospital admission accidents. They are over-represented by more than 6 times over the Ontario Vehicle Mix percentage.

Also notable is the modest under-representation of passenger cars.

6.2 SINGLE MOTOR VEHICLE ACCIDENTS BY VEHICLE TYPE

Type	No.	% Single Vehicle Accidents	% All Study Accidents
Passenger car	70	61.9	64.6
Motorcycle	29	25.7	12.1
Pick-up Truck	5	4.4	7.0
Van	5	4.4	4.3
Tractor-Trailer	1	0.8	1.4
Jeep	1	0.8	0.6
Bus	1	0.8	0.8
Other Vehicles	1	0.8	0.4
Total	113	100.0	100.0

Motorcycles are over-represented by 2 times in single vehicle accidents.

The size or type of vehicle involved in the 113 single vehicle accidents contributed to the cause of the accident or the severity of injuries in 38 (33.6%) cases.

6.3 TWO-VEHICLE ACCIDENTS BY VEHICLE TYPE

	Car	Motorcycle	Pick-up Truck	Van	Bike	Tractor-Trailer	Jeep	Bus	Train	Other	Unknown
Passenger Car	63										
Motorcycle	20	1									
Pick-up Truck	14	1	0								
Van	10	0	1	0							
Bicycle	23	0	3	1	0						
Tractor-Trailer	2	1	0	0	0	0					
Jeep	0	1	0	0	0	0	0				
Bus	1	0	0	0	1	0	0	0			
Train	0	2	1	0	0	0	0	0	0		
Other*	3	1	1	0	1	0	0	0	0	0	
Unknown	0	0	0	0	1	0	0	0	0	0	0

* includes other trucks

Of the 153 total two-vehicle accidents, collisions involving two passenger cars represent 63 or 41.2% of them. With respect to the Ontario Vehicle Mix, passenger cars should represent 60% of two-vehicle collisions.

In 68 (66.7%) of the remaining 90 two vehicle accidents and the 12 three-or-more-vehicle accidents, the police officer indicated that the vehicle mix contributed to cause of the accident or the severity of injuries.

6.4. SIZE OF PASSENGER CARS IN TWO-VEHICLE ACCIDENTS

6.4(a). METHODOLOGY OF DETERMINATION OF WEIGHT CLASS OF VEHICLE

In order to determine the size of vehicles involved in accidents, more specific vehicle identification was required. On the standard Motor Vehicle Accident Report Form the make, year, body style, colour and class of vehicle are identified. However, this is not in most cases enough information to determine the size (weight) of the vehicle. The model name is also required. On the Supplementary Accident Report Form the officer was required to include the make, model and year of the vehicle.

Specifically, the purpose of this section is to determine the effect of vehicle size differential on the extent of injuries of the occupants.

Only two-car collisions are examined in this section. Collisions involving two vehicles other than passenger cars are outlined in the Vehicle Mix section. (See Section 6.3). There were 63 two-car collisions. For 11 of these the weight of one or both of the vehicles was not determinable from the information available.* In 12 more accidents there was no significant weight differential (i.e. vehicles were in same weight class). Consequently there are only 40 two-car collisions in which the vehicle weight differential can be studied.

For analysis purposes, the various vehicle weights were classified into 7 weight classes. The exact weight of the vehicle was not always determinable from the information available but the correct weight class was usually evident. The actual weight of the vehicles may of course, vary, because of optional equipment. Also included below for reference purposes is the code for extent of injury that is used on the standard Motor Vehicle Accident Report.

* Completion of the section on model name in the Supplementary Form was generally not well done by officers. Model names from vehicle registration information were obtained directly from the police department by feeding the permit number of the vehicle into the police computer. Not all vehicle registrations contained a reference to the model of the vehicle and as a result the size could not be determined.

Weight Classes. (all figures in pounds, divide by 2.205 for kilograms)

1	-	under 2000
2	-	2000-2499
3	-	2500-2999
4	-	3000-3499
5	-	3500-3999
6	-	4000-4499
7	-	4500 and over

Injury Code

0	-	none
1	-	minimal
2	-	minor
3	-	major
4	-	fatal

6.4 (b) EXTENT OF INJURY BY WEIGHT CLASS OF VEHICLE

Weight Class	Injury of Occupants
6 1	0,0,0,0 3,3
4 6	0,2,0 0
5 1	0 2
4 5	4,3 3,3
5 1	1,1 1,3
2 4	2,2 2
6 3	2 3,2
5 4	3 3,3
5 6	1 3

Weight Class	Injury of Occupants
6 4	1,3 1
4 2	1 1,2
2 5	0,2 0,1
5 4	3 1
4 5	3 0,0
6 1	0 2,2
4 5	3 2,2
5 2	0 2
7 5	3 3,3
2 6	1,2 0,0
5 1	0 4
3 2	3 3,2
4 6	3 1,1
4 1	1,3 1,0,0,2
4 1	1,3,0,0,1 1,0,0,2
4 3	1,2 2,3
5 4	3 3
5 4	0,0,0 3

Weight Class	Injury of Occupants
4	1
5	0,2,0,0,2
2	2,2
4	2
4	1
1	3
6	0
2	2,2,3
2	3,1
4	2
3	3
4	0
1	3
6	0,1,2
7	1,0
1	2,3
4	3
5	3,3
6	0
1	2,3
4	1
2	3
3	1
4	1,2
5	0,0,0
1	0,3,0

It is clear that in the majority of collisions the occupants of lighter vehicles incur more serious injury. Certainly, there are a few exceptions and there are other factors, notably seatbelt usage, that also affect severity of injuries.

Also evident from the above table is the widening differential of severity of injury directly proportional to the widening differential in vehicle weights.

In the 52 two car collisions for which model names were available, size (weight) differential contributed to the severity of injuries in 19 or 36.5% of them in the judgement of the investigating police officer.

SELECTED VEHICLE MIX AND EXTENT OF INJURY

e: This schedule illustrates the distribution of injuries to all drivers and passengers involved in two-vehicle collisions of the selected vehicle mixes. The vehicle mixes were selected on the basis of frequency.

ected icle Mix	FATAL	MAJOR	MINOR	MINIMAL	NONE	TOTAL
senger Cars	0	0	1	2	33	36
Motorcycles	3	16	6	2	1	28
senger Cars	0	0	0	0	34	34
Bicycles	4	11	8	0	0	23
senger Cars and	0	13	5	3	9	30
k-up Trucks	0	5	6	6	8	25
senger Cars	0	9	3	5	2	19
Vans	2	6	8	4	1	21

n a motorcycle or bicycle is in collision with a passenger car, the orcyclist or bicyclist generally suffers much more severe injuries n the driver of the passenger car.

n passenger cars and pick-up trucks are in collision, the driver of passenger car will generally suffer more severe injuries.

clear trend can be established for car-van collisions.

6.6 EJECTION BY VEHICLE TYPE

	No. Full Ejection	No. Partial Ejection	Total	%	% Vehicle Type In Study*
Small Passenger Cars (Under 3,000 lbs)	9	2	11	33.3	28.8
Large Passenger Cars (over 3,000 lbs)	7	8	15	45.5	51.4
Vans	2	1	3	9.1	5.3
Pick-up Trucks	1	0	1	3.0	8.7
Jeeps	1	0	1	3.0	0.7
Tractor-Trailers	1	0	1	3.0	1.7
Other Vehicles	1	0	1	3.0	0.5
Total	22	11	33	100.0	97.1

* Motorcycles, bicycles, tricycles and trains were excluded from the calculation of '% Vehicle Type in Study', because ejection from these vehicles is practically presumed (except trains).

Note: The weight of the vehicle was determined from the model of the car. For methodology - See Section 6.4 (a).

42 persons were ejected from 33 passenger vehicles.

In those 182 Study accidents excluding pedestrians, bicycle and motorcycle accidents, there were 33 (18.1%) accidents involving an ejection from a passenger vehicle.

Small passenger cars and vans are over-represented in ejections with respect to their Study Vehicle Mix. Full ejections from small passenger cars are even more over-represented with respect to full ejections from large passenger cars.

6.7 ROLLOVER BY VEHICLE TYPE

	No. of Rollovers	%	% Vehicle Type In Study*
Small Passenger Cars (under 3,0000 Lbs.)	12	35.3	28.8
Large Passenger Cars (over 3,000 Lbs.)	12	35.3	51.4
Passenger Cars (size unknown)	1	2.9	--
Vans	4	11.8	5.3
Pick-up Trucks	4	11.8	8.7
Other Truck	1	2.9	1.2
TOTAL	34	100.0	95.4

* Motorcycles, bicycles, tricycles and trains were excluded from the calculation of '% Vehicle Type In Study', because they are not potential rollover vehicles.

Note: The weight of the vehicle was determined from the model of the car. For methodology - See Section 6.4 (a).

Small passenger cars, vans and pick-ups are over-represented in rollovers with respect to their Study Vehicle Mix.

There were 84 single vehicle accidents excluding single motorcycle accidents (113 total single vehicle accidents less 29 single motorcycle accidents). 25 of these 84 (29.8%) involved a rollover.

6.8 MECHANICAL CONDITION OF THE VEHICLE

The following vehicle defects were judged as contributory to the cause of the accident or the severity of injuries. Vehicle types are indicated in brackets.

Shallow Tire Tread (Car)

Pin Holding Front End to Frame Sheared Off (Motorcycle)

No Headlamps (Motorcycle)

Kick Stand Fell Down (2 Motorcycles)

Hand Brakes Faulty When Wet (Bicycle)

Rusted Front and Weak Metal Offer Little Protection (Car)

Gas Pedal Stuck Under Stop Bolt (1 Car and 1 Tractor-Trailer)

Note that mechanical defects noted on automobiles are very minor.

SECTION 7 - ROADWAY-RELATED ACCIDENT FACTORS

7.1 ROAD SURFACE CONDITION

Dry	296
Wet	34
Total	330

In the judgment of the investigating police officer, wet roads contributed to the cause of 11 accidents.

7.2 ROAD SURFACE

Asphalt	306
Gravel, Crushed Stone	23
Earth	1
Total	330

In the judgment of the investigating police officer, a gravel road surface contributed to the cause of 9 accidents.

7.3 SPEED LIMIT ON PRINCIPAL ROAD OF ACCIDENT

Speed Limit (km/hr)	No.
50	189
60	46
80	72
Other	17
Unknown	6
Total	330

From speed limit information one can 'guesstimate' the urban-rural environment of the accident. However, these data can be misleading, because lower speed advisory signs in rural areas add to the accidents occurring in 50, 60 and other speed zones.

7.4 ROAD LOCATION

Road Location	#	Study %	Motorcycle Accidents (%) (Sample is 61)	Bicycle Accidents (%) (Sample is 30)	Pedestrian Accidents (%) (Sample is 52)
Non-Intersection	159	48.2	49.2	46.7	57.7
Intersection Related	40	12.1	13.1	6.7	1.9
Intersection	88	26.7	18.0	26.7	21.2
At/Near Private Drive	34	10.3	11.4	16.7	15.4
At Railway Crossing	5	1.5	6.6	0.0	0.0
Overpass/ Bridge	3	0.9	1.6	0.0	0.0
Underpass/ Tunnel	1	0.3	0.0	3.3	0.0
Total	330	100.0	100.0	100.0	100.0

Pedestrian accidents are slightly over-represented at non-intersections and private drives.

The sampling of bicycle accidents is too small to attempt to establish any significant difference from the Study average.

Motorcycle accidents are slightly under-represented at intersections. Also 4 of 5 accidents at railway crossings involved motorcycles.

7.5 PAVEMENT MARKING

Mentioned as contributory to the cause of the accident in 4 instances.

7.6 TRAFFIC CONTROL

Traffic Signal	45	School Bus	0
Stop Sign	51	No	227
Yield Sign	2	Other	0
Pedestrian Crossover	0	R.R. Crossing (no lights)	2
Police Control	0	R.R. Crossing (gate)	1
School Guard	0	Caution Light	2
		Total	330

7.7 ROAD ALIGNMENT

	No.	Study %	Motorcycle Accidents (%) (Sample is 61)	Lost Control Accidents (%) (Sample is 116)
Straight Level	228	69.1	52.5	53.4
Straight Hill	24	7.3	6.6	6.0
Curve Level	60	18.2	29.5	31.9
Curve Hill	17	5.2	11.5	8.5
Unknown	1	0.3	0.0	0.9
Total	330	100.0	100.0	100.0

Almost 31% of Study accidents occurred at locations with curves and/or hills.

Note that 41% of motorcycle accidents occur at curve level and curve hill locations and the Study average for these alignments is only 23.4%.

Accidents in which the Driver Action is Lost Control are also over-represented significantly at curves (40.4% to 23.4%).

7.8 ILLUMINATION

Poor illumination was mentioned as contributing to the cause of 22 accidents. However, the term illumination was unfortunately not always interpreted as street lighting by the investigating police officer as was the intention.

In most cases where street lighting was cited as a contributing factor the accident location would not warrant corrective measures, e.g. a low volume rural road.

7.9 FIXED OBJECTS

Fixed Object	No. Vehicles	No. Fatalities*
Pole (Rigid)	33	7
Tree	28	3
Ditch	24	1
Fence	16	4
Curb	11	4
Parked Vehicle	11	0
Restraining Barrier	9	6
Post	8	0
Culvert	6	0
Pole (breakaway)	5	1**

*Number of persons killed in vehicles that struck the specified fixed object. Some fatalities are counted more than once, if more than one fixed object was struck.

**vehicle also struck a tree

Rigid poles, trees and ditches were the fixed objects struck most often.

The most number of fatalities occurred when vehicles struck rigid poles.

However, the highest number of fatalities per number fixed objects struck ratio belongs to restraining barriers.

7.10 ACCIDENT SITE INSPECTION PROGRAM

Police officers cannot be expected to provide expert technical information on road design or road environment. However, their experience in traffic accident investigations certainly qualifies them to judge whether or not roadway factors contributed to the cause or severity of the accident. It was felt that in the past, research into roadway factors has been too often restricted to a description of conditions or circumstances such as those contained in the Standard Motor Vehicle Accident Report Form (Road Location, Road Character, Road Condition, etc.) This section emphasizes the roadway factors that contributed to the cause of the accident or to the severity of injuries.

In order to supplement and confirm police information on contributing roadway factors, an Accident Site Inspection Program was undertaken. The accident locations to be investigated were screened by the Study Coordinator on the basis of whether or not the roadway design or environment was indicated in the accident report as, or suspected of, contributing to the cause or severity of the accident.

There were 90 inspections of accident sites (27.3%). Not all sites were inspected where contributing roadway factors were indicated. It was felt that in some cases roadway factors such as wetness, gravel surface and alignment did not warrant inspection if the investigating officer clearly indicated contribution to the cause of the accident.

In 29 of the 90 inspections, no roadway factor was judged as contributory to the accident. In many of the inpsections it was evident that the factor contributed, but it was felt the roadway design or environment should not necessarily be altered. This was especially true of accidents in which alignment was a factor. At 8 of the 90 accident sites roadway factors were judged to make such a 'major' contribution to the cause of the accident such that they could be deemed 'primary' causes.

7.11 ROAD DESIGN AND ROAD ENVIRONMENT FACTORS

FACTOR	NUMBER	'PRIMARY' CAUSE
Alignment *	50	
Improper Signing	8	2
Narrow or Soft Shoulder	7	
Irregular Surface	6	2
No Warning Sign - Curve	5	3
Narrow Road	5	
Heavy Traffic	4	
No Warning Sign - Stop Sign	3	
Hidden Intersection	3	3
Bushes/Trees Near Roadway	3	
Through Highway Looks Less Prominent (reason to display stop sign)	2	
Sign Obscured	2	
Sign Not Prominent Enough	2	
No Sidewalk	2	
Loose Stones on Road (reason for skidding)	2	
Too Much Commercial Lighting	2	
Weak Restraining Barrier (post and cable)	1	
On Street Parking	1	
Railroad Track Runs Down Centre of Roadway	1	

*In some cases, alignment contributed to the cause of the accident by its mere presence in the roadway -- it caused the driver to change direction, an action which precipitated the accident. But, in most cases, alignment was not deemed sufficiently 'deficient' that a careful driver would have any serious problem.

SECTION 8 - ENVIRONMENTAL CONDITIONS

8.1 WEATHER

	#Accidents	%
Clear	303	91.8
Rain	24	7.3
Snow, Sleet	0*	0.0
Fog, Mist, Smoke	3	0.9
Total	330	100.0

*The Study was conducted in the summer months.

As mentioned in Section 7.1, wet roads contributed to 11 accidents in the judgment of the investigating police officer.

8.2 DAYLIGHT

	#	%	Average Exposure*
Daylight	181	54.8	61.4
Dark	132	40.0	34.4
Dawn	5	1.5	4.2 (dawn and dusk combined)
Dusk	11	3.3	
Unknown	1	0.3	-
Total	330	100.0	100.0

*Figures based on sunrise and sunset times for the four summer months. The length of time for dawn and dusk periods was estimated at one hour in total.

Accidents in hours of darkness are over-represented with respect to exposure to darkness.

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